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Christine Taylor Klein. The Quiet Dissemination of American Modernism: George Sakier's Designs for American Radiator. *Design Issues*, Volume 28, Number 1 (Winter 2012), pp. 81-90

Edmundo Morales. Indigenous Hats and Headdresses in the Andes. *Design Issues*, Volume 28, Number 1 (Winter 2012), pp. 91-96.

Introduction

This issue of *Design Issues* reminds us that "successive generations often think they exist under special conditions of turbulence and dramatic change beyond those of previous generations" (Hobday, Boddington and Grantham). Accordingly, the collected papers address a broad range of perspectives on design that, together, remain intrinsic to the human condition. Walt Whitman once observed, "There was a child went forth every day, and the first object he look'd upon, that object he became." So these papers chart a seamless link between the physical world of objects and our inner spaces of feeling and thought. Together, they remind us that we first make objects then objects make us. As we change the world, it begins to change us. Moreover, these papers highlight the powerful and mediating influence that design can have in helping to shape human relationships or when social cohesion is to be formed then sustained.

Tracy Bergstrom's paper sheds new light on the relationship between Eric Gill and Count Harry Kessler (for production of the Cranach Press's fine book Canticum canticorum Salomonis). Kessler's earlier patronage of Gill's fellow Ditchling craftsman, Edward Johnston, caused a sea-change to Germany's national visual sensibility. Whereas Edward Johnston politely bridged the mediaeval and the modern, Eric Gill's eccentric arrival in Weimar raised eyebrows. Here, Bergstrom traces the ways in which Kessler had to adjust his customary relationship, as a patron, to this now more willful design presence personified by Eric Gill. Christine Taylor Klein's paper on the work of American designer, George Sakier, describes a quieter but, perhaps, more powerful influence on a nation's sensibilities. Though painting remained Sakier's passion, he relished the idea that his designs could inject the ideals of modernism into domestic objects that, eventually, would find their way into homes across the nation. Just as Bahar Emgin draws our attention to the ways in which design interventions can revive the lives of undistinguished objects so does Edmundo Morales illustrate how everyday things can be invested with the codes of a social hierarchy. His images of Andean headdresses contain the remnants of Colonial imposition.

In their analysis of social thinking for empathic design, Carolien Postma, Kristina Lauche and Pieter Jan Stappers outline a framework intended to provide designers with a thinking tool to better understand the user experience. Marc Steen continues

this debate by arguing that innovation is often driven by techno-logical developments, rather than by concerns for users' needs and preferences. Udo Kannengiesser and John Gero further this discussion by exploring the ways in which users and artifacts can interact with each other in order to create dynamic effects. They go on to suggest that dynamics like this can extend beyond the intentions of a designer when first conceiving an artifact. Finally, Hobday, Boddington and Grantham conclude their two-part paper with an overview of approaches to, and theories of, design and innovation studies. In this, they first assess the antecedents to design as a problem-solving activity. This is followed by a reflection on the indeterminate nature of design and its complex challenges. They then examine insights from leading American scholars concluding with a consideration of the relationship between modern design sensing and the broader context of human-centered approaches to management.

Herbert Simon once observed that "Human beings, viewed as behaving systems, are quite simple. The apparent complexity of our behavior over time is largely a reflection of the complexity of the environment in which we find ourselves." The papers in this issue seek to address this richness and complexity as it evolves through the dynamic relationships that designers stimulate between the physical world of things and the inner worlds of thought.

Bruce Brown
Richard Buchanan
Dennis Doordan
Victor Margolin

Erratum:
In Kjetil Fallan's book review, *Design and Truth*, by Robert Grudin, in *Design Issues* Vol 27 no. 4, the sentence on page 103 which reflects the retail price of the Eames Lounge Chair should have read, "...(in my local retailer here in Oslo, it sells for c. USD 9,400 – add another 3,300 for the accompanying ottoman.) Now how's that for abuse of power?" We regret the error.

As Choice as Could Be: Eric Gill, Harry Graf Kessler, and The Cranach Press's *Canticum canticorum Salomonis*

Tracy C. Bergstrom

The Cranach Press's *Canticum canticorum Salomonis* represents a highlight in the history of modern book design and fine press printing; the volume's unusual format, combined with Eric Gill's illustrations and the use of Jenson antiqua type, create a striking and memorable work. The publication of *Canticum canticorum Salomonis* also marked a turning point in the working relationship between Gill and the publisher of the Cranach Press, Harry Graf Kessler. Although Kessler has been previously portrayed in scholarly publication as the dominating force behind *Canticum canticorum Salomonis*, a close examination of their personal correspondence and interactions reveals that Gill increasingly began to assert artistic independence in their collaboration and determined many significant aspects of the volume's style. Gill's long-standing interest in the text of the "Song of Songs" and its mixture of eroticism and spirituality, combined with his desire to experiment with method and technique, resulted in a project for which Gill guided the selection of text, illustration program, and salient aspects of the book's production.

The perception that Kessler firmly directed all creative production of his Press artists and coaxed them into producing superior work originates with Weimar-era publications—most notably, Rudolph Alexander Schröder's influential 1931 assessment of the Press's output, "Die Cranach-Presse in Weimar."[1] Schröder claims that Kessler's varied intellectual ventures prepared him to guide the work of individual artists toward his desired ends. In an examination of the typefaces designed for the Cranach Press by Emery Walker and Edward Johnston, for instance, Schröder mentions Kessler's work as a student of William Morris and as the publisher of the Art Nouveau journal, *Pan*, as experiences that provided him with the artistic vision and clarity to direct the activities of Walker and Johnston. The success of these typefaces can thus be attributed to Kessler's oversight, in that "their rich diversity provides a suitable foundation for the freedom and wealth of expression that are the distinguishing characteristics of all of Kessler's prints."[2] In

1   Rudolph Alexander Schröder, "Die Cranach-Presse in Weimar," *Imprimatur: Ein Jahrbuch für Bücherfreunde*, (1931) 91-112.
2   Ibid., 94.

Schröder's narrative, this relationship exists not only with Walker, Johnson, and Gill, but with all artists Kessler employed to work on Cranach Press publications. He claims about Aristide Maillol that:

> One need only remember that Maillol, the sculptor, would probably never have emerged as the erudite and satisfying illustrator and graphic artist whom we know from his magnificent prints of Virgil's Eclogues if the founder of the Cranach Press had not encouraged him and provided him with both a goal and clarification of what the occasion demanded.[3]

Schröder's assessment of Kessler as a master manipulator permeates scholarship to the present day, as seen in Laird M. Easton's recent biography, Th*e Red Count: the life and times of Harry Kessler*.[4] Regarding the Cranach Press's 1926 publication, *The Eclogues of Virgil*, Easton writes:

> Years of patient, tenacious prodding on the part of Kessler, gently but firmly shepherding such temperamental egos as Maillol, Gill, the calligrapher Edward Johnston, the letter-cutter Edward Prince, the printer Emery Walker, and others toward the goal he had in mind, resulted in one of the most striking printed books of the twentieth century.[5]

The first major book-length survey of the Cranach Press, published by Renate Müller-Krumbach in 1969, reinforced the notion that Kessler maintained tight control over salient artistic decisions pertaining to successful publications of the press but added explicit criticism of Gill's involvement.[6] In her analysis of *Canticum canticorum Salomonis*, Müller-Krumbach compliments the aspects of the publication overseen by Kessler, writing that the "dimensions, binding, typeface and layout of the *Song of Songs* give the impression of an exquisite bibliophile treasure."[7] Her assessment of Gill's contributions to the volume is not so charitable, however: "Gill's ornamented initials and his illustrations seem a poor fit in this context."[8] The argument centers on the assertion that Gill's illustrations failed within the volume because they deviated from Kessler's specifications:

> [The illustrations] are, in contrast to all previous principles of the Cranach Press, neither linear nor flat, but plastic and three-dimensional, and thus serve as opposition and counterpoint to the typography rather than as its complement. Velvety black areas in which the color white is largely absent have been printed above a dark brown ground. White is used only to trace the contours which, since they are composed of very fine cross hatching, do not mark continuous lines but rather produce a luminous iridescence.

3   Ibid., 102-3.
4   Laird M. Easton, *The Red Count: The life and times of Harry Kessler* (Berkeley: The University of California Press, 2002).
5   Ibid., 371.
6   Renate Müller-Krumbach, *Harry Graf Kessler und die Cranach-Presse in Weimar* (Hamburg: Maximilian-Gesellschaft, 1969).
7   Ibid., 63.
8   Ibid.

This technique, which imitates ones more properly found in engravings, does not meet Kessler's original demands for woodcut illustrations…. It remains surprising that Kessler had these illustrations printed at such great expense…[9]

More recently, John Dieter Brinks's essay, "In search of sensuality: Kessler's and Gill's Songs of Songs," is effusive in its praise of the volume but seeks to establish that Kessler dictated all aspects of Gill's work and was thereby responsible for its success.[10] Brinks establishes the theme early on in the essay, writing:

> When Eric Gill later looked back on his life he would attest to what he had already known at the age of forty-three: that the course of his life, both aesthetically and materially, was in many ways connected to Kessler's and that it was he who had given him a vital impetus.[11]

In the section of the essay titled "Kessler's Conception of the Book," Brinks lays out five specifications that Kessler purportedly dictated to Gill to guide him in his work: the book's physical dimensions, the use of color in the illustrations, the gilding of the illustrations, the dramatization of the text, and the shading of the illustrations.[12] All of these characteristics are present in correspondence between the two, and all except the physical dimensions would evolve through Gill's independent work from Kessler's original conception of the volume, as preserved in his working notes.[13]

This present essay seeks to reexamine these perceptions concerning Kessler and Gill's relationship and working processes. Their correspondence and individual diary entries document that Kessler was quick to accept Gill's changes in direction for the project and that their relationship was a much more egalitarian one than is suggested by previous critics. While their correspondence does show that Gill's illustrations did not follow Kessler's initial specifications for the project, it also records that Kessler was extremely pleased with the images and their context within the publication. A review of archival evidence also demonstrates that Gill exerted substantial control over many aspects of the publication, including its textual contents, and that his decisions outside Kessler's recommendations led to the book's critical acclaim.

The story of how Gill and Kessler decided on the "Song of Songs" for a Cranach Press publication is frequently recounted. Kessler records in his diary that the two were together at Goupil Gallery in March 1925 to view Gill's statue of a sleeping Christ when Kessler asked if Gill would be interested in illustrating a Cranach Press volume. Gill replied that he would be pleased to create a set of illustrations for a Latin edition of the "Song of Songs" or, alternately, illustrations to "Ananga-Ranga," whose text he described to Kessler as "well, in reality: thirty-four ways of doing it."[14] Kessler wisely

9   Ibid., 64.
10 John Dieter Brinks, "In Search of Sensuality: Kessler's and Gill's *Song of Songs," The Book as a Work of Art: The Cranach Press of Count Harry Kessler* (Laubach: Triton, 2005), 146-67.
11 Ibid., 148.
12 Ibid., 152-4.
13 See the page from Kessler's notebook reproduced in Brinks, "In Search of Sensuality: Kessler's and Gill's *Song of Songs*," 153.
14 Harry Graf Kessler, *Tagebuch*, March 13, 1925, Deutsches Literaturarchiv, Schiller-Nationalmuseum.

chose to pursue the first option. The informality of this exchange, however, belies the pragmatic nature of their long relationship leading up to the project. The two were introduced in the spring of 1904, and their first meeting occurred on September 7, 1904, according to Gill's diary.[15] Their initial correspondence established a relationship of Gill as contract worker and Kessler as artistic and financial advisor. As early as 1908, Gill was advanced money from Insel-Verlag zu Leipzig at Kessler's request, in the hope that "your ancient pleasure for working will return and that this will induce you to fill our orders before others."[16] Their relationship took a preliminary turn in January 1910 when Kessler arranged for Gill to work as an apprentice to Aristide Maillol in Marly-le-Roi; Gill, however, was uncomfortable with the idea of apprenticing to someone with whom he spoke no common language and who was located far from his residence in Ditchling, and he backed out at the last minute.[17] Kessler's response to Gill regarding the incident was cool, as he reiterated his belief that Gill would have benefitted from Maillol's experience, but Kessler nonetheless also had to recognize Gill as a more independent and willful artist than he had previously perceived.[18] The overall tone of their correspondence evolved to show a more equitable relationship after this incident, with Kessler's inclusion of Gill on major projects in the next few years, such as his proposed Nietzsche memorial.

By the time of their joint work for the Cranach Press, Gill had developed into a mature artist of great experience, including previous publications and illustrations of the "Song of Songs." Gill's interest in the "Song of Songs" bridged several decades. He first published his thoughts on the text in an essay titled, "The Song of Solomon and Such-like Songs," which spanned several issues of *The Game* in 1921. This essay was revised and published at St. Dominic's Press as an independent publication in 1921, under the title, *Songs Without Clothes: Being a Dissertation on the Song of Solomon and Such-like Songs*; it was further revised and published under the same title in *Art-nonsense and Other Essays* in 1929. In the essay's introduction, Gill claims that, "the Song of Solomon is a love song, and one of a very outspoken kind, and in modern England such things are not considered polite."[19] Thus, Gill's attraction to the eroticism of the text and its interpretive potential was manifest, and makes his 1925 offer to Kessler of illustrating either the "Song of Songs" or "Ananga-Ranga" less incongruent than it initially appeared. The essay continues with Gill's thoughts on the intrinsically religious nature of the "Song of Songs," providing Gill with a platform to develop his beliefs on the symbiotic nature of sexuality and spirituality:

> But everything is religious by which God is praised, and
> in this sense the Song of Solomon is a religious poem indeed.
> Not only is God praised in it, and by it, but His praises are

15 Eric Gill, Diary, September 7, 1904, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

16 Insel-Verlag zu Leipzig to Eric Gill, March 30, 1908, typescript letter with second page missing, box 93, folder 9, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

17 Eric Gill, *Autobiography* (New York: Devin-Adair, 1941), 178-82.

18 Harry Graf Kessler to Eric Gill, January 24, 1910, box 93, folder 9, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

19 Eric Gill, *Songs Without Clothes: Being a Dissertation on the Song of Solomon and Such-like Songs* (Ditchling: St. Dominic's Press, 1921).

20 Ibid., 3.

Then up early to the vineyard,
  to see if the vine-stocks be in bud,
  if the tendrils be unfolding,
  if the pomegranate flower:

there will I give my breasts to thee.
The love-apple smells sweet, every fruit
is at our gate; both new and old, dear love,
I have laid up for thee.
Oh! that thou wert given me for brother,
  suckled at my mother's breast, so that
  finding thee without I could kiss thee
  and none make scorn of me therefor!

Figure 1
Page 39: "Ibi dabo tibi." Eric Gill, *The Song of Songs: Called by Many the Canticle of Canticles.* Waltham St. Lawrence, (Berkshire: Golden Cockerel Press, 1925.) Reproduced from the original held by the Department of Special Collections of the University Libraries of Notre Dame.

21 Edward Johnston, [Canticum canticorum], England, Wing MS ZW 945.J654, Newberry Library. Penciled on Johnston's manuscript is "3 Hammersmith Terrace," which dates the manuscript to the timeframe between 1905 and 1912, when Johnston resided at this address.
22 Eric Gill, *Autobiography*, 130.
23 See Brinks, "In Search of Sensuality: Kessler's and Gill's *Song of Songs*" (150) for this argument.
24 Harold Hannyngton Child, "Prints and pictures," *Times Literary Supplement,* November 26, 1925, 793.
25 R. A. Walker, "Engravings of Eric Gill," *The Print-Collector's Quarterly*, 15:2 (April 1928), 162.
26 Herbert Furst, "On the appreciation of the modern woodcut," *Artwork*, 2:6, January to March 1926, 91. Reproduced in the article is an unused print produced for Golden Cockerel Press's *The Song of Songs:* "Swineherd," 1925; see J. F. Physick, *The Engraved Work of Eric Gill* (London: Her Majesty's Stationery Office, 1963), catalog number 337.

sung in the strongest of all symbolic terms. The love of man and woman is made the symbol of God's love for man, and of Christ's love for the Church.[20]

These principles, expressed in numerous other writings by Gill, had been in formation for some time and also manifested themselves visually in the 1925 Golden Cockerel Press publication, *The Song of Songs: Called by many the Canticle of canticles.* [see Figure 1] One source for Gill's initial artistic interest in the "Song of Songs" may be a manuscript prepared by Edward Johnston. This vellum model contains portions of the "Song of Songs" text, arranged and hand-lettered by Johnston.[21] Of the five passages from the "Song of Songs" selected by Johnston, portions of three were later included and illustrated by Gill in either his Golden Cockerel Press or his Cranach Press treatments of the text. Johnson and Gill had enjoyed a close relationship since their time as roommates in 1902-03, and their influence on one another continued throughout the next two decades.[22]

Critics have argued that Gill wished to illustrate the "Song of Songs" to redeem himself from the failure of the 1925 Golden Cockerel Press edition, but this perception is not supported by contemporary evidence.[23] Reviews of the Golden Cockerel Press's *The Song of Songs: Called by many the Canticle of Canticles* expressed admiration of Gill's contributions to the volume. The Times Literary Supplement stated:

> And Mr. Eric Gill's woodcuts, seventeen in all, perform the triple function of being beautiful in themselves, of forming a part, not an interruption, of the page, and of helping the reader's imagination into the heart of this love-story.[24]

Subsequent assessments of the Golden Cockerel Press's publication recognize it as a "definite advance in style" within Gill's oeuvre.[25] Reviews contemporary to the publication of the Golden Cockerel's *The Song of Songs* demonstrate that Gill's experiments with woodcutting and engraving techniques were also noted and valued. In an article titled "On the appreciation of the modern woodcut," Herbert Furst cites Gill's output as demonstrating the zenith of modern wood engraving techniques:

> … to crown it all, Mr. Eric Gill uses the block of hard wood and engraves it in *black*-line as if it were a steel engraving— with the result that such cuts of his as "The Shepherdess" recently shown at the Redfern Gallery, look like, and are in fact outline engravings—intaglio prints, but from wood instead of metal.[26]

meʒ/retirerent les homeʒ champe-
ſtreʒ auecqueʒ eulx pour ſe fortifier.
Touteſſoiʒ ce pendant Orgetorix
mourut. Et diſoyent les ſouyceʒ,
que luymeſmeʒ ſeſtoit occis, affin —
de neſtre puny par iuſtice

Le Roy demande.
La mort de Orgetorix fut elle—
cauſe de garder les ſouyceʒ

Figure 2
F. 9v: Swiss burning their villages. François
du Moulin and Albert Pigghe, *Commentaires
de la guerre gallique*, France, Central, 1519.
London, British Library, Harley MS 6205,
saec. xvi1. Image © The British Library Board,
Harley MS 6205.

27 François du Moulin and Albert Pigghe,
    Commentaires de la guerre gallique,
    (France, Central, 1519). London, British
    Library, Harley MS 6205, saec. xvi1;
    details recorded in Kessler, Tagebuch,
    Wednesday, September 21, 1927,
    Deutsches Literaturarchiv, Schiller-
    Nationalmuseum, as: "Ich gieng mit
    beiden [Gill and Douglas Cockerell]
    dann ins British Museum u. besah
    mit Gill das schöne Manuscript eines
    Dialogs zwischen Caesar und Franz I von
    Frankreich, das für diesen von Albert
    Pigghe geschrieben und mit Miniaturen
    geschmückt worden ist."
28 Harry Graf Kessler to Eric Gill, October
    23, 1927, Wing Modern M. S. Kess,
    Newberry Library.
29 Eric Gill, Canticum Canticorum Album,
    1930, 92.1.2799, Eric Gill Collection,
    Harry Ransom Center, University of Texas
    at Austin.

These reviews and knowledge of Gill's longstanding interest in the text provide explanation as to why Gill would wish to illustrate the "Song of Songs" twice in less than a decade and also offer insight into factors that contributed to the design of the Cranach Press publication. His previous work with the "Song of Songs" allowed Gill to enter into conversations with Kessler with firmly established views about the content of the text and its interpretative potential. The reviews demonstrate that Gill was being praised both for his treatment of the text and for his willingness to experiment in technique and output—the latter of which would come to fruition in the Cranach Press publication.

Kessler and Gill began focused discussions of the design of the Cranach Press volume in September 1927. Both recorded in their personal diaries a visit to the British Museum on September 21, 1927, during which they looked at several objects, including what I believe can be identified as *Les Commentaires de la guerre gallique*, Harley MS 6205, illuminated by Godefroy le Batave and dated to 1519.[27] [see Figure 2] This manuscript is illuminated in semi-grisaille, using a palette of grays and blues, with added highlights of gold. Subsequent correspondence confirms that Kessler took note of both the unusual dimensions (240 x 120mm) and the coloring of the manuscript. He wrote to Gill on October 23, 1927:

> I also enclose proofs of the "Song of Songs." There are three different proofs. No 1. exactly the size of the British Museum manuscript, No. 2. one line longer and No. 3 two lines longer… If you could cut one illustration in three blocks to be printed in black, grey and blue, I could have a number of different trial proofs printed and that would give us something to start from.[28]

Despite these instructions, sketches record that Gill explored the use of a more liberal color palette as he began to work on initial designs for the project. An early sketch for "Nigra sum sed Formosa," preserved in an album labeled "orig. designs & first proofs of engravings," reveals one of Gill's first attempts at the visualization of this pivotal text.[29] [see Figure 3] While the sketch is undated, its characteristically elongated format, which mimics the proportions of the Harley manuscript, strongly suggests that it was executed after their visit. It uses a subdued and judicious palette of pink and green and includes several additional figures that are peripheral to the central figural grouping, all of which would subsequently be dropped by Gill. Another early sketch perhaps illustrates portions of the "Song of Songs" included by Gill in his 1925 Golden Cockerel Press treatment of the text: "Come, love, let us fare forth into the fields, and in the hamlet lodge. Then up early to the vineyard, to see if the vine-stocks be in bud, if the tendrils be unfolding, if the pomegranate flower: there I will give my breasts to thee."[30] It uses the same color palette as the design for "Nigra sum sed Formosa,"

Figure 3 (above)
"Nigra sum sed Formosa." Eric Gill, Canticum
Canticorum Album, 1930, 92.1.2799.
Eric Gill Collection, Harry Ransom Center,
The University of Texas at Austin. Photo
reproduced courtesy of the Harry Ransom
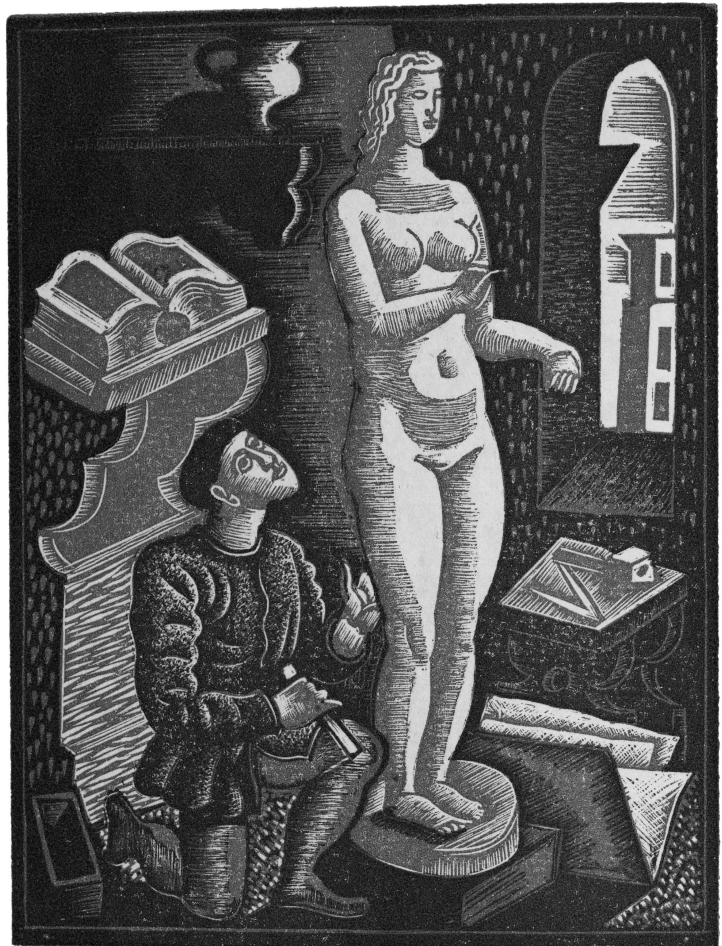Center, The University of Texas at Austin.

Figure 4 (right)
Frontispiece. John Marston, illustrated by
Rene Ben Sussan, *The Metamorphosis of
Pigmalions Image.* Waltham St. Lawrence,
Berkshire: Golden Cockerel Press, 1926.
Reproduced from the original held by the
Department of Special Collections of the
University Libraries of Notre Dame.

30 A comparison of the Golden Cockerel
Press and Cranach Press editions shows
that eight of the same verses were
used in both editions, so Gill's choosing
to experiment with a text that he had
treated in the past would not have been
unlikely; the verses used in common
are 1:12, 1:14, 2:8, 4:12, 5:2, 5:7, 7:12,
and 8:2 as numbered in the Douay-
Rhiems edition.

but integrates figures into a stylized landscape that would come to be distinctive in all of the finished prints for the volume.[31] Although Gill did not develop either of these sketches for inclusion in the final publication, his variation in approach and palette demonstrate that, with the exception of the size parameters Kessler had provided, Gill experimented profusely in his initial designs. Gill's independent thinking about the volume's design would not ultimately result in the use of color, but it did engender designs much more radical than Kessler envisioned.

Kessler's letter to Gill on October 23, 1927, also addressed the potential technique of the prints to be used by Gill in the Cranach Press publication. In the time between their visit to the British Museum in September and the date of the letter, Gill had sent Kessler a copy of Golden Cockerel Press's *The Metamorphosis of Pigmilions Image*, with engravings by Rene Ben Sussan—presumably as an example of a contemporary volume using a muted color palette. However, Kessler was not impressed with Ben Sussan's technique or use of color, describing the prints as "barbarous."[32] Kessler's only exception to this assessment was the doublet of Pigmalion found in the frontispiece of the volume, which he describes as "*stippled* (not

Figure 5
"Tu pulchra es." Enclosed with manuscript letter from Eric Gill to Harry Graf Kessler, July 26, 1929, Wing Modern M. S. Kess, Newberry Library. Photo courtesy of The Newberry Library, Chicago. Wing MMS Kess.

shaded by little strokes or lines)." [see Figure 4] From this evaluation Kessler offers a recommendation that Gill consider the stippling effect for the surface of the prints, "employed judiciously to break up blocks of colours." As to the treatment of figures, which Kessler describes as consisting of "mainly of nudes," he writes:

> Possibly black, a delicate and bold black outline, such as you have used in the first "Song of Songs" and the "Procreant Hymn" might be the simplest and most satisfactory solution.[33]

In the remaining portions of the letter, Kessler reiterates his judgment that the combination of a stippled surface, combined with the sparing use of gray, blue, and gold, will produce a "a rich, harmonious effect." This letter thus lays out several specifications for Gill to follow in preparing designs for the project—namely, the use of stippling in conjunction with color to variegate the surface of the prints and the use of strong black outlines to differentiate figures from other elements of the design. However, Gill would adopt neither of these stipulations in the final prints for *Canticum canticorum Salomonis*.

Various projects between the fall of 1927 and the summer of 1929, including the production of the Golden Cockerel Press's *Canterbury Tales*, intervened and kept Gill from serious work on Kessler's volume. Kessler records in his diary that the two spoke in person about the Cranach Press project in October 1928 and then again in May 1929 and, at this latter time, discussed again the use of gray, blue, and black in the illustrations.[34] Gill's diary entries indicate

31   Eric Gill, [Unidentified scene], 1927, UF00077976, George A. Smathers Libraries, University of Florida. See http://ufdc.ufl.edu/UF00077976/00001 (accessed June 15, 2011).
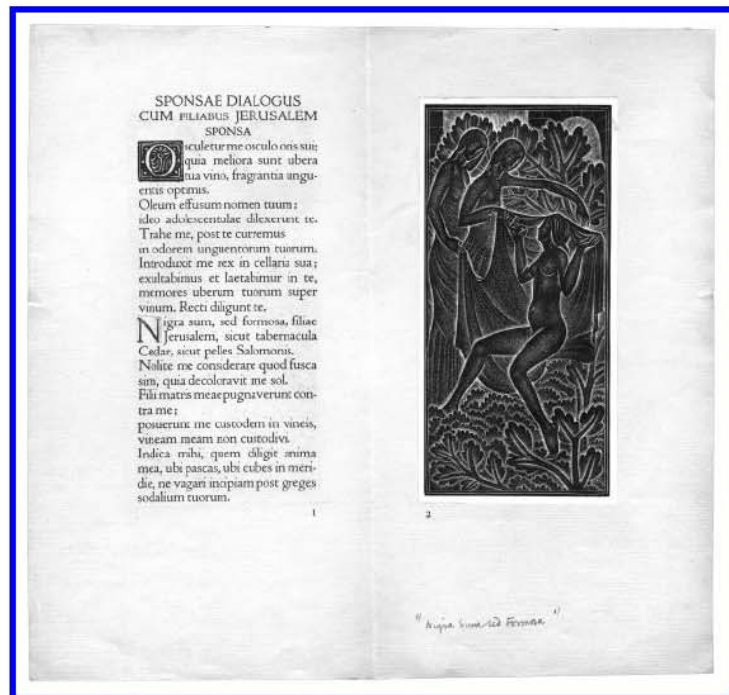32   Harry Graf Kessler to Eric Gill, October 23, 1927, Wing Modern M. S. Kess, Newberry Library.
33   Ibid.
34   Harry Graf Kessler, Tagebuch, Thursday, May 16, 1929, Deutsches Literaturarchiv, Schiller-Nationalmuseum.

that he began work on preliminary designs for the project on June 29, 1929; he then sent his initial proofs in a letter to Kessler dated July 26. Enclosed with the letter were three prints: two versions of "Tu pulchra es" using two and four blocks, respectively, and one print of "Nigra sum sed Formosa."[35] One of the "Tu pulchra es" prints uses blue and gray color blocks, as the two had previously discussed would be appropriate, but Gill writes of this one that "it is not at all the kind of refined & delicate and subtle and rather solemn & somber thing I had in mind." [see Figure 5] He refers to "Nigra sum sed Formosa" as "in someways a more successful affair," although he offers the following assessment:

> But—when I got going upon it I discovered I was doing a thing which did not lend itself to colour at all—so it seems to me. I don't see how a colour block would work in with it—the sort of luminous edges can't be anything but white and mere spots or lines of colour wouldn't belong to the same scheme of things.[36] [see Figure 6]

While the rest of the letter concludes with apologies to Kessler that the proofs probably will not meet with his liking, Gill's diary entries indicate that his printing activities for much of the month of July had been occupied by experimenting with just such a variegated aesthetic that was contrary to his traditional engraving style. Other prints from this immediate time period include "Belle Sauvage II" for the large paper edition of *Art-nonsense and other essays* and three designs for a publication of *Leda* by Aldous Huxley.[37] Gill had

35 Eric Gill to Harry Graf Kessler, July 26, 1929, Wing Modern MS Kess, Newberry Library. The prints of "Tu pulchra es" are catalog number 614 and a variant and the print of "Nigra sum sed Formosa" is catalog number 618 in J. F. Physick, *The Engraved Work of Eric Gill* (London: Her Majesty's Stationery Office, 1963).

36 Eric Gill to Harry Graf Kessler, July 26, 1929, Wing Modern M. S. Kess, Newberry Library.

37 See catalog numbers 606, 615, 616 and 617 in J.F. Physick, *The Engraved Work of Eric Gill* (London: Her Majesty's Stationery Office, 1963).

adopted Kessler's suggestion to convey depth through stippling but ultimately decided that such a technique and the use of color were not compatible.

Although Kessler's response to these initial prints has not been located, Gill sent a letter to Kessler on August 2, 1929, that states, "I was very glad to get your letter last evening … I am very glad indeed that you like the prints I sent."[38] The two discussed the project intermittently throughout the months of August and September, and both recorded a meeting on September 25, 1929, at Gill's home at Pigotts near High Wycombe in Buckinghamshire. At this meeting, they decided on a November delivery date for the initial designs. Gill wrote to Kessler on October 26 that he was "now about to begin designs for the S of Songs," and his diary entries indicate that he worked on the project throughout the early part of November.[39] Efforts stalled as both individuals worked on other projects during the following months, but they resumed efforts on this project in March 1930. Gill worked throughout much of the spring on prints and paste-ups; on June 4, he sent Kessler a note that read, "I have now finished all the Engravings for the S. of S. except the initials and am now starting on these. I enclose some rough proofs which I hope you will like."[40] Gill and Kessler began making plans for Gill to travel to Weimar for the printing of text proofs soon after. Gill wrote on June 9:

> I am most glad that you are pleased with the Engravings, and that Maillol also thinks well of them. I will bring the blocks when I come which will be towards the end of next week if that will be convenient to you.[41]

Gill's time in Weimar, while successful for the objectives at hand, can also be read as a prelude to the difficult times ahead. Gill records in his diary that he arrived at Weimar on June 30, 1930, with the sentiment, "Count Kessler met me at train station - most kind."[42] Kessler describes the arrival somewhat differently: "Gill was immediately visible in the station in his odd garb: knee stockings, a short black cassock, and brightly colored scarf. He said that all of Cologne was looking at his legs—was this perhaps because his stockings were so thin? I think he likes the attention as an eccentric."[43] Regardless, the two began work in the press almost immediately. Gill's diary entries reveal that they spent the first few days of his 11-day visit engaged in printing trials at the press and the remaining time experimenting with gilding.[44] Although the two had exchanged detailed letters and proofs by mail throughout the previous year, Gill had only recently begun the engraving of initial letters and other detail work. Early proofs of the first page of the Latin version of the text, for example, use initial letters that Gill had created in 1926 for the Cranach Press's *The Eclogues of Virgil*.[45] Their time together in Weimar thus represented their only chance to combine all of their individual contributions.

38 Eric Gill to Harry Graf Kessler, August 2, 1929, Wing Modern M. S. Kess, Newberry Library.

39 Eric Gill to Harry Graf Kessler, October 26, 1929, Wing Modern M. S. Kess, Newberry Library.

40 Eric Gill to Harry Graf Kessler, June 4, 1930, Wing Modern M. S. Kess, Newberry Library.

41 Eric Gill to Harry Graf Kessler, June 9, 1930, Wing Modern M. S. Kess, Newberry Library.

42 Eric Gill, Diary, June 30, 1930, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

43 Harry Graf Kessler, Tagebuch, Monday, June 30, 1930, Deutsches Literaturarchiv, Schiller-Nationalmuseum.

44 Eric Gill, Diary, June 30, 1930 to July 10, 1930, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

45 See the proof belonging to the St. Bride Printing Library, London, reproduced in Brinks, "In Search of Sensuality: Kessler's and Gill's *Song of Songs*," 155. The initial letters are catalog number 314 in J. F. Physick, *The Engraved Work of Eric Gill* (London: Her Majesty's Stationery Office, 1963).

However, Kessler and Gill's diverging aesthetic visions kept them at odds about the finished product. Two issues in particular concerning the production of the volume remained to be resolved during Gill's stay in Weimar: the use of colored inks for the running title heads and initial letters and the gilding of engravings and initials. Gill had written to Kessler that before his departure he would go to London and procure colored inks to experiment with while in Weimar.[46] Their correspondence that took place immediately after Gill's visit continued the discussions; on July 27, 1930, Gill wrote: "I think Green (a bluish green) would look very well with the blue & black but fear it might destroy the rather delicate somberness we are aiming at."[47] Kessler continued his attempts to integrate blue into the volume in the manner of the Harley *Les Commentaires de la guerre gallique* manuscript, writing on December 30, 1930, of "… the letter C itself being printed in pure Lapislazuli ultramarine. The effect I think magnificent."[48] Kessler also favored the use of slender golden frames around the illustrations, in addition to the other gilding.[49] Kessler's position both on the use of color and on gilding imply that he wished for the finished volume to possess an antiquated aesthetic, including rubricated and gilded initials set off from the text frame. Gill, on the other hand, clearly had a more avant-garde effect in mind. His written comments always remained noncommittal about both color and gilding; for instance, he writes at one point that, "[w]ith regard to the question of gilding, I will keep this in mind and we will make experiments when the engravings are done."[50] In the end, however, the changing state of finances both for Kessler and for the Cranach Press did not allow either of these luxuries to be carried out in production. Initial letters were gilded in many of the deluxe copies, but no additional gilding or supplemental ink colors, other than for the running titles, were used.

By the time the book was printed the following spring, the distribution and sale of such luxury items was becoming increasingly difficult. Announcements were printed specifying that the Latin edition would be sold in England at 3½ guineas each for copies on handmade paper, of which 200 were produced; at 7 guineas each for morocco-bound copies on Japanese paper, of which 60 were produced; and at 30 guineas each for morocco-bound, hand-gilded copies, of which 8 were produced.[51] The prices for the first two categories were lowered almost immediately to 3 and 6 guineas, respectively; a letter to Gill from the Cranach Press, dated June 2, 1931, clarified that, "[t]he price has for certain reasons appurtaining [sic] to continental sale been reduced."[52] An agreement to handle sales was struck with Douglas Cleverdon, who had worked extensively with Gill to publish and distribute *The Engravings of Eric Gill*. Although disagreements surfaced as to the conditions of rebate that would be offered to Cleverdon, his initial sales looked promising; he sold three copies on vellum in advance of the month of October alone.[53]

46 Eric Gill to Harry Graf Kessler, June 9, 1930, Wing Modern M. S. Kess, Newberry Library.

47 Dated manuscript reply, in Gill's hand, written on Harry Graf Kessler to Eric Gill, July 19, 1930, box 93, folder 9, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

48 Harry Graf Kessler to Eric Gill, December 30, 1930, box 93, folder 9, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

49 Undated page from Kessler's notebook, published in Brinks, "In Search of Sensuality: Kessler's and Gill's *Song of Songs*," 153.

50 Eric Gill to Harry Graf Kessler, March 31, 1930, Wing Modern M. S. Kess, Newberry Library.

51 *The Song of Songs in Latin* publication announcement, box 26, folder 15, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

52 Cranach Press to Eric Gill, June 2, 1931, box 93, folder 9, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

53   Harry Graf Kessler to Eric Gill, October 5, 1931, box 93, folder 9, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

As a result of both this encouraging start and the worsening financial conditions in Germany, Kessler dispatched the whole Latin edition to Gill on November 2. Their arrangement specified that Gill would then provide copies to Cleverdon, upon Kessler's direction, as they were sold. Included in the agreement letter is Kessler's assessment of the volume and the situation as a whole:

> I think it is one of the most beautiful series of illustrations produced in modern times and that the book will appeal to everybody and all interested in fine illustration and book making. Of course, times are hard and difficult, but still one must hope that a sufficient number of people and fortunes have survived the crisis and will continue to buy fine books and thus make their production possible.[54]

The books themselves were received by Gill at High Wycombe on November 13, essentially removing Kessler from further control of the sale.[55] Thus, Kessler, who had at one time effectively dictated every financial operation of the press, now depended on others for the success of the publication.

The initially promising purchasing figures proved misleading, and sales of the book were dismal. Douglas Cleverdon halted all communications with Kessler after November 1931 and sold only a small number of the copies he had initially received. Sales were so poor that Kessler was unable to pay Gill the sum of £55 for work completed on the project. In a letter dated July 6, 1932, Kessler explained that, "[i]t is practically impossible for me to send them [£55] from Germany, and unfortunately, the way in which Cleverdon has handled the "Song of Songs" business, has not made it possible for me to pay you in England."[56] In addition, correspondence documents that Kessler tried to redeem the book's reputation and sales over the next year by commissioning other booksellers to take over all transactions in England.[57] However, the damage had already been done, and the publication did not receive the widespread acclaim and distribution that Kessler and Gill desired for it. Kessler continued to promote the volume, writing to Gill from exile in Palma de Mallorca in May 1935 that Gill should send "a few copies of this most beautiful book" to be displayed in an exhibition there.[58] The letter makes clear that, while Kessler was forced to occupy himself in Spain in reminiscence, mounting an exhibition of Cranach Press books and working on his memoirs, Gill had moved on to other work and new commissions. Kessler begins the letter:

> I have not heard from you for so long, that I am beginning to feel rather anxious, lest you should have entirely forgotten me. I think of you often, and am glad sometimes to hear about you through the papers.[59]

54 Harry Graf Kessler to Eric Gill, November 2, 1931, box 93, folder 10, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

55 Shipping receipt, dated November 13, 1931, box 93, folder 10, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

56 Harry Graf Kessler to Eric Gill, July 6, 1932, box 93, folder 10, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

57 Harry Graf Kessler to Eric Gill, September 20, 1932, box 93, folder 10, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

58 Harry Graf Kessler to Eric Gill, May 6, 1935, box 93, folder 10, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

59 Ibid.

Figure 7
Pages 26-27: "Ibi dabo tibi." Harry Graf Kessler and Eric Gill, *Das hohe Lied Salomo*. Weimar: Cranach Press, 1931. Reproduced from the original held by the Department of Special Collections of the University Libraries of Notre Dame.

No additional correspondence about the project exists until Kessler's death in 1937, which left at Gill's disposal 120 copies on handmade paper and 3 on vellum.[60] As Kessler had kept 44 copies on Japanese paper in 1931 for his own distribution, remarkably few copies of the Latin edition had been disseminated.[61] Gill tried to negotiate with various entities, including Faber & Faber Publishers, to sell the remaining books for the £55 owed to him by Kessler, and he eventually reached this agreement with Kessler's sister, the Marquise de Brion, in July 1939.[62] Thus concluded the ignoble state of affairs that befell one of the final Cranach Press publications.

Reviews of *Canticum canticorum Salomonis* nonetheless expressed admiration for the volume, and Gill's independent contributions to the project were noted and respected. The *Times Literary Supplement* called it "as choice as could be."[63] In particular, the review complimented Gill's illustrations for the volume and noted his development as an artist between the 1925 Golden Cockerel Press edition and the new Cranach Press edition of the text:

> And in Mr. Gill's work there is no loss of the old passion; but there is a great increase in depth and in spirituality. An example of peculiar interest is the contrast between the two engravings... The similarity and the difference between the rhythms of the two might be taken as an epitome of the growth of Mr. Gill's conception of his whole subject.[64] [See Figure 7]

60 Eric Gill to Faber & Faber, June 27, 1939, box 93, folder 10, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

61 Harry Graf Kessler to Eric Gill, November 2, 1931, box 93, folder 10, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

62 Eric Gill to the Marquise de Brion, July 19, 1939, box 93, folder 10, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles.

63 Short review, "Reprints," *Times Literary Supplement*, March 10, 1932, 173.

64 Ibid.

Gill's own bookkeeping records indicate that individual prints sold well; in fact, all prints except for "Invenerunt me custodes" and "Dilecti mei pulsantis" sold out.[65] Reviews outside of England also praised Gill's efforts. Rudolph Alexander Schröder, who previewed the volume before it was available for general sale, wrote:

> Gill will present himself as an illustrator and illuminator who here, in his very first attempt, reaches an inventiveness and technical mastery that is absolutely incomparable. His prints will combine the hieratic splendor of the most opulent works by Morris with a totally new sensuous life and with a unique style that, in my opinion, raise this unfinished book into an example of the spiritual essence and the conceptual freedom that make the products of the Cranach Press, which in so many ways seem directed against the taste and tendency of their times, in truth works that speak to the highest needs of their age.[66]

More modern assessments of the volume also express admiration but frequently overlook *Canticum canticorum Salomonis* in favor of Gill's *Four Gospels* among his illustration cycles.[67] The former's prints are often described as "luminous" or "sensuous," but little of depth has been written about the shift in style in their technique and their avant-garde appearance in relation to Gill's earlier prints. This essay aims to promote Gill's innovations and contextualize them within the final product of *Canticum canticorum Salomonis*. The technique and content of the illustrations, which in the past have been tied to Kessler's oversight, instead rest firmly with Gill, as do the selection of the text and the volume's production details. Although Kessler held the upper hand throughout much of their long, collaborative working relationship, Gill's emotional connection to the text of the "Song of Songs" and his confidence in his technique and artistic vision for the text provided him with the maturity and authority to guide the production of *Canticum canticorum Salomonis*.

Acknowledgements

65 Eric Gill, List of work, 1910-1940, series 7.1, M. S. Gill, William Andrews Clark Memorial Library, University of California at Los Angeles. These are catalog numbers 665 and 668 in J. F. Physick, *The Engraved Work of Eric Gill* (London: Her Majesty's Stationery Office, 1963).

66 Rudolph Alexander Schröder, "Die Cranach-Presse in Weimar," *Imprimatur: Ein Jahrbuch für Bücherfreunde*, 1931, 103.

67 See, for example, John Harthan, *The History of the Illustrated Book: the Western tradition* (London: Thames and Hudson), 269.

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An Innovation Perspective on Design: Part 2

Mike Hobday, Anne Boddington, Andrew Grantham

Introduction

This paper examines critical new challenges in design thinking and innovation studies,[1] building on the innovation perspective on design discussed in Part 1 of this article.[2] Here, we argue that the design/design thinking field and innovation studies can learn from each other in interesting ways. For its part, innovation studies could benefit from understanding the range of different design processes, approaches, and categories that contribute to industrial development and economic growth, as well as to strategic advantages for individual firms. From a theoretical standpoint, innovation scholars would gain from fully conceptualizing design and its role in business, the economy, and the wider society, and from incorporating design into successive generations of the innovation theories and models now common in innovation research.

Emerging empirical evidence in innovation studies shows that design is a driver of innovation and productivity in the United Kingdom, and probably in all advanced economies.[3] The methods and measurement techniques used in innovation could address the contribution of design in much more detail and reveal the ways in which design creates value across the industrial and service sectors. Theoretically, we argue in the paper, design and innovation studies together could offer a convincing alternative to the traditional view of the firm as a rational, machine-like entity by drawing on the social and creative character of businesses revealed in design thinking.

In Section 1, we assess the antecedents to modern design thinking and the interpretation of design as a general problem-solving activity. We show why design should be viewed not simply as problem-solving but more importantly as a knowledge generation and integration activity. In Section 2, we illustrate the indeterminate nature of design, elaborating on the unique, complex, and "wicked" nature of design challenges. From the innovation field, we also show the importance of understanding the subjective character of "capability" in meeting design challenges, emphasizing the importance of human knowledge, skills, experience, and capacity for learning. Section 3 examines some of the ideas and insights from leading American scholars concerned with design appreciation,

1   In a recent conference at Weatherhead School of Management (June 2010), key speakers (e.g., Buchanan and Collopy) criticized the term design "thinking" as too centered (by implication) on rational, left/logical brain activity. Design "sensing" was offered as one possible alternative. The two terms are used here interchangeably, along with design appreciation.

2   M. Hobday, A. Boddington, and A. Grantham, "An Innovation Perspective on Design: Part 1," *Design Issues* 27:4 (Summer 2011), 5-15.

3   NESTA, *The Innovation Index: Measuring the UK's Investment in Innovation and Its Effects* (London: National Endowment for Science, Technology and the Arts, 2009).

while Section 4 tries to relate modern design sensing to the broader context of human-centered approaches to management. Finally, we conclude by suggesting some of the benefits that could arise from a more integrated design/innovation approach that combines insights and methods from both areas.

Section 1: From Design to Design Thinking: Antecedents to Design Thinking

The interpretation of design as a general problem-solving activity has a long-standing tradition, rooted in ideas from social planning theorists—notably Horst Rittel, who formulated the notion of "wicked problems."[4] Wicked problems are seemingly intractable, knotted clusters of interdependent problems or challenges, occurring under conditions of uncertainty and having multiple potential solutions. Conklin recently applied issue-based information systems to wicked problems in design through the application of collaborative, social information and communication technologies.[5] Similarly, Armand Hatchuel takes Herbert Simon's work on design science and bounded rationality as a starting point for approaching wicked problems, and from there proposes a new, contemporary appreciation for design—not as a rational problem-solving activity, but as a socially based, solutions-generating process that is capable of offering the means to address a wide range of wicked problems and challenges.[6]

Building on the work of Rittel, Conklin argues that we are in transition from an age of science to an age of design. He proposes that the past two centuries were predominantly scientifically driven, focused on explaining the natural world through science and then transforming it by inventing and harnessing technologies. The goal of management science was to predict and control the future, using facts and problem-solving techniques as the primary means to achieving these goals. The problems to be solved, although complicated, were not in the "wicked" category; instead, they were relatively tame and self-contained, and external conditions were comparatively stable.

While Conklin's arguments concerning an age of design are attractive to many of us living in today's fast-moving, high-tech world, the likelihood is that wicked problems have always existed and that, today, we merely confront a new generation of wicked problems. In fact, wicked problems exist in relation to the capabilities (i.e., the accumulated skill, experience, and knowledge) of the engineers, designers, planners, and other professionals confronting such problems. The earlier problems that seem relatively simplistic by current standards might well have appeared equally as daunting to the pioneering designers of past centuries as the design problems facing engineers, designers, and planners of today.[7]

4   H. W. Rittel and M. M. Webber, "Dilemmas in General Theory of Planning," *Policy Sciences* 4:2 (1973), 155-69.

5   J. Conklin, *Dialogue Mapping: Building Shared Understanding of Wicked Problems* (London: Wiley, 2005).

6   A. Hatchuel, "Towards Design Theory and Expandable Rationality: the Unfinished Programme of Herbert Simon," *Journal of Management and Governance* 5:3-4 (2002), 260-73.

7   We return to the issue of design capability in more detail in Section 2.

Indeed, successive generations often think they exist under special conditions of turbulence and dramatic change beyond those of previous generations. For example, consider Karl Marx's description of the industrial and social changes he saw:

> constant revolution of production, uninterrupted disturbance of all social conditions, everlasting uncertainty and agitation … All fixed, fast frozen relations … and opinions are swept away, all new formed ones become antiquated before they can ossify … The need of a constantly expanding markets for its products … over the whole surface of the globe … All old-established national industries have been destroyed or are daily being destroyed. They are dislodged by new industries, whose introduction becomes a life and death question for all civilised nations … so also in intellectual production. The intellectual creations of individual nations become common property … and from numerous national and local literatures, there arises a world literature.[8]

Similarly, a century later, Joseph Schumpeter, the grandfather of innovation studies, developed the concept of creative destruction to describe what he saw as:

> … a process of qualitative change … of revolutions … of industrial mutation … that incessantly revolutionizes the economic structure *from within*, incessantly destroying the old one, incessantly creating a new one.[9]

Schumpeter stressed the creative role of the entrepreneur in generating new products and technologies as well as entire business sectors:

> It is not that kind of competition [price competition] which counts but the competition from the new commodity, the new technology, the new source of supply, the new type of organization … – competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives.[10]

Despite his potential underestimation of previous challenges, Conklin's modern observation nevertheless has merit. As he argues, today's wicked problems cannot be solved using scientific facts, description, prediction, or control alone. Today's wicked problems undoubtedly require the creation and development of shared narratives and new social meanings to mobilize the capabilities for developing solutions to the specific challenges of the day.

Hatchuel reaches similar conclusions to those of Conklin.[11] Working through Herbert Simon's notions of design science and heuristics, Hatchuel shows how Simon's ideas are limited because

8   K. Marx and F. Engels, *The Communist Manifesto* (Middlesex: Penguin Books, 1967), 83.

9   J. A. Schumpeter, *Capitalism, Socialism, and Democracy* (London: George Allen & Unwin Ltd., 1943). Cited in A. Bergek, C. Berggren, and T. Magnusson, "Creative Accumulation: Integrating New and Established Technologies in Periods of Discontinuous Change," *Working paper: Knowledge Integration and Innovation in Transnational Enterprise Research Group*, Linköping University, Sweden: Department of Management and Engineering (2010), 3.

10   Ibid.

11   Conklin, *Wicked Problems.*

they are rooted in problem-solving and bounded rationality. He proposes a new term, "expandable rationality," to describe the design process, using a paradigm of design that can provide solutions to Rittel's wicked problems. Like Conklin and others, Hatchuel identifies the importance of collective social interaction, arguing that we need to appreciate the social dynamics of the design process as an essential part of design itself.

Also like Conklin, Hatchuel argues for the need to create learning devices (e.g., prototypes) as a means to understand and test possible solutions to complex or wicked problems. Hatchuel proposes a wider application of design theories, recognizing their relevance to economics, innovation, and organizational theory. Building on Simon's initial critique of growth through optimization and perfect choice theory, Hatchuel suggests that design should not be viewed simply as a problem-solving activity but also as a knowledge generation and integration activity. Economic growth and the expansion of wealth rely in part on the design and creation of new spaces for technological possibility. These spaces, in turn, require the human ability to design and create stories, forms, and concepts that underpin business and wider economic innovation.

Section 2: The Indeterminacy of Design Challenges
In a landmark article, Buchanan develops a critique of Simon's rational problem-solving approach to design.[12] Based on further elaboration of Rittel's wicked problems, Buchanan shows how design challenges are unique and complex and have multiple possible solutions. They are therefore indeterminate in nature and rarely, if ever, have a single solution, as in the case of trivial or routine problems. As an approach to wicked problems, Buchanan argues that design has "no special subject matter of its own, apart from what a designer conceives it to be. The subject matter of design is potentially *universal* in scope, because design thinking may be applied to any area of human experience."[13] [original italics]. In this statement, Buchanan justifies the claim that the new field of design thinking can be applied not only to business management, but also to all other complex, indeterminate social and economic challenges.

One problem with the discourse being described is that it tends to imbue "the wicked problem" and, with it, the "solution" with an overly objective character. All design challenges, and the projects in which they are addressed, have an equally important *subjective* dimension. For example, if Business A faces a wicked problem but has carried out a dozen similar wicked projects before, then it is not as wicked a problem as the exact same problem facing Business B, which is new to this class of problem. Therefore, the exact same "problem" might be more or less wicked, depending on the capability (i.e., the experience, knowledge, and skill) of the observer. In fact, Business A, despite its greater experience in certain projects, might find a different class of relatively simple projects very

12 R. Buchanan, "Wicked Problems in Design Thinking," *Design Issues* 8:2 (1992), 5-21.

13 Ibid., 16.

"wicked" because of its lack of experience in that kind of project. Business A might also find that its capability turns out to be a handicap or incompetence when it faces a new class of problem but is locked into a particular way of working—a phenomenon called core rigidity in the innovation literature.[14]

This subjective notion of "capability" implies the need to examine the subject (e.g., the designer or design team) in relation to the object (i.e., the challenge at hand). In discussing a design challenge, we *always* need to consider the human knowledge, skills, experience, *and capacity for learning* to know whether, and to what extent, a problem is wicked in the first place. The object cannot be divorced from the subject. Therefore, we need to recognize and develop the notion of design capability as an important dimension of design and design thinking.

What is meant by the term "design thinking" has been understood in a number of different ways. For example, Rowe conceptualizes design thinking in terms of socially and geographically contextualized decision-making.[15] Martin, in contrast, characterizes design thinking as an "... unwavering focus on creative designs of systems ..." for both innovation and efficiency.[16] For Brown, design thinking is a model that allows firms to integrate design into their core activities as a spur to innovation.[17] He reflects recent work on design thinking in management studies that seeks to elevate design and the skills of designers to a core strategic function in the management of the firm, rather than seeing them as a technical task or discipline.

Various tools from design are offered as valuable instruments for generating solutions. From architecture, such tools include various forms of visualization, including drawings, sketches, computer graphics, and prototypes; from new product design, companies like IDEO (a design consultancy) and Frog Design propose creative processes that include "un-focus" groups and ethnographic techniques.[18]

Whether the promises of design thinking can be fulfilled is still up for debate. For example, Jahnke is sceptical about design thinking as a workable innovation model for firms, arguing that design is chronically under-researched and poorly understood as a business function.[19] Although IDEO is often put forward as an exemplar, Jahnke argues that "[t]hese accounts are fairly superficial and do not in any detail describe experiences from the process of implementing design thinking. To add to this lack of knowledge, few, if any, empirical academic studies have as yet sought to understand the implications of applying design thinking as a model for innovation."[20]

14 D. Leonard-Barton, "Core Capabilities and Core Rigidities: a Paradox in Managing New Product Development," *Strategic Management Journal* 13:S1 (1992), 111-25.

15 P. G. Rowe, *Design Thinking* (Cambridge: MIT Press, 1987).

16 R. L. Martin, *The Design of Business: Why Design Thinking Is the Next Competitive Advantage* (Boston: Harvard Business Press, 2009), 7.

17 T. Brown, "Design Thinking," *Harvard Business Review* 86:6 (2008), 84-92; T. Brown, *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation* (New York: Harper Business, 2009).

18 Brown, "Design Thinking," H. Esslinger, *A Fine Line: How Design Strategies are Shaping the Future of Business* (San Francisco: Jossey-Bass, 2009).

19 M. Jahnke, *Innovation Through Design Thinking: An Experimental Study of the Implementation of Design Thinking in Non-designerly Firms: Report for the Doctoral Education Seminar on 25% Level* (Gothenburg: HDK, School of Design and Crafts, Business & Design Lab, The Faculty of Fine, Applied and Performing Arts, University of Gothenburg, 2009).

20 Ibid., 5.

Section 3: The Design Thinking School

Design thinking or design sensing ideas are most deeply explored by American scholars, including Buchanan, Boland, and Collopy of the Weatherhead School of Management. Similarly, Yoo et al. make the distinction between organization design as a noun, and organizational designing as a verb; the latter, they say, is an action undertaken by a person or a group according to their vision, culture, and purpose.[21] They use the term design "Gestalt" to capture the approach, or organizing pattern, of the renowned architect Frank O. Gehry and his practice, Gehry Partners. Yoo et al. argue that this Gestalt is made up not only of a vision but also of multiple representation technologies and a strong commitment to a user-engaged, collaborative process of design and construction. This process of organization designing, they argue, is becoming more important as the experiential- and knowledge-based parts of the economy expand.

Collopy captures the spirit of design thinking / sensing through the traditional caricature of the left brain (logical / analytical) versus right brain (creative / imaginative) distinctions.[22] He argues that managers need to engage both sides of their brains to function well. Modern management and management education have evolved with a strong left / logical emphasis, using process models, objectives, data, decision-making procedures, management by measurement, and other such tools. More attention needs to be given to empathy, emotion, perception, and imagination in management, especially when facing complex, fast moving, uncertain, and difficult challenges. As Collopy contends, designers and design thinkers are arguing for a massive improvement in our understanding of how to apply "the right-hand side" to management. The ultimate goal is a holistic, integrated "left-right" approach. In the meantime, this movement requires a huge rebalancing effort in favor of the right-hand design side.

Collopy builds on previous work with Boland, in which they argue in favor of a "design attitude" to management, contrasting this approach with the conventional "decision attitude" to problem-solving.[23] They show how management education and practice have relied far too heavily on a narrow, limited, and technically rational approach that has left little room for the imagination and creativity. Typically, a manager is portrayed as an individual who faces a set of decision alternatives and has to make an optimum choice. In contrast, a design attitude assumes that the main challenge is to generate and develop alternative solutions from which to choose. In the design view, the choice is a relatively trivial exercise. From a business and financial perspective, it makes much more sense to expand the range of options so that the "wrong" choice (from currently available decision alternatives) can be avoided and all the benefits of a broader set of well-informed choices on a key area

21 Y. Yoo, R. J. Boland, and K. Lyytinen, "From Organization Design to Organization Designing," *Organization Science* 17:2 (2006), 215-29.

22 F. Collopy, *Firing on All Eight Cylinders, Position Statement for the "Convergence: Managing and Designing" Conference* (Cleveland, Weatherhead School of Management, June 17-19, 2010).

23 R. J. Boland and F. Collopy, "Design Matters for Management," in *Managing as Designing*, eds. R. J. Boland and F. Collopy (Stanford, Stanford Business Books, 2004).

(e.g., new product, process innovation, business strategy, or organizational structure) can be considered. They argue that the decision attitude only really applies in a clearly defined, stable environment, where all the main alternatives are well-known. However, in the most challenging areas—strategy, innovation, new market creation, people management, and leadership—stability and boundaries are not the norm. And when alternatives are unknown, a design attitude is required. In historical terms, the scientific basis of modern management needs to be replaced or at least rebalanced in favor of a creative, design-based approach to management according to Collopy.

Taking this further, Lucy Kimbell argues much of the design thinking discourse focuses on what managers do or should do, in terms of both individual and group action.[24] Kimbell, in contrast, draws on theories of organizational practice to provide a new conceptual approach that situates design, designers, and their collaborators—especially clients and users—within the larger organizational context. Kimbell offers two concepts that enable us to better understand design: first, using the verb, "design-as-practice" (rather like Yoo et al., as well as Mintzberg's "strategy as practice"),[25] Kimbell encourages the examination of "what designers do"—what goes on (as far as we can know) in their minds and in their shared, embodied, and situated routines, as well as in their relationships with the artifacts they use, make, and work with; second, she uses the noun, "designs-in-practice," which stresses the emergent nature of design outcomes and the particular outputs of designers, including blueprints, models, specifications, visual representations, and final products (recognizing also that the "final" may well continue to be redesigned by the user after delivery). Kimbell applies this conceptual approach to an example of service design, showing the usefulness of viewing design in the context of actual practice.

In articulating these concepts, Kimbell draws on the earlier work of management psychologists and theoreticians of practice—notably, Schön and Weick, who have much to offer the field of design sensing because they go beyond the "rational vs. non-rational" debate. They open up the black box of the process of designing and look at what is actually designed.[26] Further research along these lines could help provide insight on the tools and processes used by designers that relate to the wider world of management.

From the perspective of organizational psychology, Weick notes that "[d]esign is usually portrayed as a forethought that leads to an intention."[27] However, he argues, "beginnings are rare, middles are common. People, whether designers or clients, are always in the middle of something, which means that designing is as much about re-design, interruption, resumption, continuity,

24   L. Kimbell, *Design Practices in Design Thinking*, Mimeo (Oxford: Said Business School, 2010).

25   H. Mintzberg, "Crafting Strategy," *Harvard Business Review* 65:4 (1987), 66-75; Kimbell, *Design Practices in Design Thinking*, 12-3.

26   D. A. Schön, *The Reflective Practitioner: How Professionals Think in Action* (London: Basic Books Inc., 1983); D. A. Schön, "Designing: Rules, Types and Worlds," in *Managing as Designing*, eds. R. J. Boland and F. Collopy (Stanford, Stanford Business Books, 2004); K. E. Weick, "Rethinking Organizational Design," in *Managing as Designing*; K. E. Weick, "Designing for Thrownness," in *Managing as Designing*.

27   Weick, "Designing for Thrownness," 74.

and re-contextualising, as it is about design, creation, invention, initiation, and contextualising." Weick uses the idea of "thrownness" to capture this idea of the practice of re-design, indicating that designing is seldom, if ever, a "blank sheet" activity.

Section 4: Situating Design Thinking Within Management Studies

These intriguing new formulations of design do not yet tell us how design thinking differs as a management approach from other human-centered approaches to management. Of the many who have studied the differences, we can begin with Mary Parker Follett, who rejected the scientific management ideas of Frederick W. Taylor because she saw firms as social groups rather than simply as economic units.[28] Chester Barnard, later, developed the idea of informal organizations and processes as central to all forms of business activity.[29] Other more recent human-centered approaches are those of Goleman, on emotional intelligence and its advantages over analytical intelligence, Mintzberg, who views strategy as an emergent craft, and Checkland, working on "soft systems."[30]

In fact, the human, "soft" side of management has a tradition, probably as long as management itself, which means that we need to fully understand the distinctiveness of the design approach and to appreciate it within a comparative context so that we can identify clearly what design thinking brings to the table that other human-centered approaches do not. So far, this distinctiveness is not clear from the literature. Presumably, the different domains of design bring different insights and approaches. Within each domain, we need to understand the advantages and disadvantages of the different approaches, methodologies, tools, processes, assumptions, concepts, and bodies of knowledge. There likely is not one single "design thinking" toolkit for managers. In general, we need to know much more also about the skills and know-how that designers apply to their challenges and which ones can and cannot be transposed into different domains.

Leading proponents of design thinking (e.g., Buchanan, Conklin, and Hatchuel) argue that it potentially applies not only to management but also to other arenas of creative human activity where wicked problems are confronted. These arenas include public policy, education, health care, research, politics, and social and economic development, among others. In the case of solving wider social problems, including the planning of new environmentally sustainable cities, evidence already suggests that creative design thinking has a great deal to offer, not only in developed but also in developing countries.[31] This observation again raises the issue of design capability and capability gaps. Not all countries and cultures encourage the development of capabilities in design. Given inequities, how can less developed but potentially capable

28 F. W. Taylor, *Principles and Methods of Scientific Management* (New York: Harper and Row, 1911); M. P. Follett, *The New State* (London: Longmans, 1918).

29 C. I. Barnard, *The Functions of the Executive* (Cambridge: Harvard Business Press, 1938).

30 D. Goleman, *Working with Emotional Intelligence* (London: Bloomsbury, 1998); H. Mintzberg, "Crafting Strategy," P. Checkland, *Systems Thinking, Systems Practice* (Chichester: John Wiley, 1981).

31 S. Burnham, *Finding the Truth in Systems: In Praise of Design-Hacking* (London: Royal Society for the Arts, 2009).

32 V. Margolin, "Design, the Future and the Human Spirit," *Design Issues* 23:3 (Summer 2007), 4-15.

33 For the role of design and designers in shaping the future, see also L. Kimbell, "Manifesto for the M(B)A in Designing Better Futures," in *The Handbook of Design Management*, eds. R. Cooper, S. Junginger, and T. Lockwood (Oxford: Berg, 2011).

34 C. Lindblom, "The Science of 'Muddling Through,'" *Public Administration Review* 19:2 (1959), 79-88. Lindblom's insights were later developed into "Logical Incrementalism" by Quinn (J. B. Quinn, *Strategies for Change: Logical Incrementalism* (Homewood, Irwin, 1980).

35 B. Klein, and W. Meckling, "Application of Operations Research to Development Decisions," *Operations Research* 6:3 (1958), 352-63; T. A. Marschak, "Strategy and Organization in a System Development Project," in *The Rate and Direction of Inventive Activity: Economic and Social Factors*, Conference of the Universities-National Bureau Committee for Economic Research and the Committee of the Social Science Research Council (Princeton, NJ: Princeton University Press, 1962); B. H. Klein, "The Decision Making Problem in Development," in *The Rate and Direction of Inventive Activity: Economic and Social Factors*, Conference of the Universities-National Bureau Committee for Economic Research and the Committee of the Social Science Research Council (Princeton NJ: Princeton University Press, 1962).

36 Mintzberg's use of the term "craft" rather than design also raises the issue of the gap/distance between design as "planning" of the new artifact, and the actual realization of it, via craft. Where does design end and craft/engineering implementation begin? Craft is presumably defined differently from design (and is not a subset of it) but has been shown to be a valuable concept in business strategy. So how does design thinking compare with and overlap with craft as practice? See Mintzberg, "Crafting Strategies;" M. E. Porter, *Competitive Strategy: Techniques for Analyzing Industries and Competitors* (New York: The Free Press, 1980).

37 F. G. Hilmer and L. Donaldson, *Management Redeemed: Debunking the Fads that Undermine our Corporations* (New York: The Free Press, 1996).

populations learn from the more capable, more developed, and more effective ones? As Margolin argues, designers are trained in the main disciplines that create the artifacts, products, systems, networks, architectures, infrastructures and constructs that make up the social world.[32] However, they are rarely represented in the major policy and academic debates about the future. He also argues that the design professions currently lack a sense of coherence or vision about the possibilities for "designing" the future, although they could potentially be an incredibly important force for realizing an improved future.[33]

On the face of it, design thinking has great potential in its applicability to a broad spectrum of social, economic, environmental, and developmental challenges that rise to the level of wicked problems. But we need to understand this broader promise in greater depth, and we need evidence of results so far achieved in social and economic experiments. As in the case of business strategy and practice, we need to understand the distinctive essence of the principles and tools of design thinking compared with other approaches.

The need for understanding the particularity of design thinking is further emphasized when we consider that some of the new propositions made by design proponents mirror those of earlier scholars in some of these "other" domains. For example, writing in 1952, Charles Lindblom famously argued against the rational approach to public policy, showing that, despite its widespread application, it is deeply flawed analytically and in practice. In "The Science of Muddling Through," Lindblom argued that under conditions of uncertainty and incomplete information, "muddling through" in a step-by-step manner is the only rational way to proceed.[34] Indeed, Klein and Meckling and Marschak all made similar points in their research into R&D and U.S. military systems, concluding that, under conditions of uncertainty, decision making in significant and changing areas must involve creative learning and a progressive narrowing of options—very different from the "normal" rational task of scheduling and resource allocation.[35] In the field of business strategy, Henry Minzberg interprets strategy as an iterative, human-centered "craft," rather than the more rational market positioning model of Porter and others.[36] More recently, Hilmer and Donaldson also show why, in general, management systems and tools need to be accompanied by informal human involvement, support, and guidance.[37]

That scholars have questioned the rational approach to problems in other domains is not surprising. Because uncertainty and complexity tend to prevail in most important areas of strategy and policy, the critical challenge is to develop the learning capability of the organization, so that knowledge can be gradually gained from the environment and taken into account during the policy-making process or in any other wicked problem area.

For the broader application of design thinking to become more than a management fad, it must compete for its place among these other approaches to complexity and uncertainty in human activity, especially in management. Defining and then realizing its distinctive contribution to business and social issues is key. In fact, defining both the distinctive strengths and weaknesses in design thinking is necessary. Products, systems, and artifacts, the normal domains of design, are clearly quite different from groups of people and organizations. Nevertheless, the intentional application of cross-disciplinary design thinking in a creative, non-linear way may well bring new and interesting elements to the management of wicked problems. All these issues call for theoretical conceptualizations of design beyond what is currently available so that we might understand what design offers to management and its potential role in the economy, society, and politics.

Toward a Research Program of Innovation/Design Studies
In general, design and design thinking have been poorly conceptualized, researched, and taught by innovation studies. However, at this juncture, it is possible for the design/design thinking field and innovation studies to learn from each other in interesting and productive ways. Although we do not intend to outline here a complete innovation/design research program, we would like to highlight some of the research issues and questions arising from our discussion. The broader question of where design might "fit" within various branches of the social sciences is an interesting issue for further research.

For example, if innovation researchers take design more seriously, they might well discover that a wide range of different design processes, approaches, and categories already underpin industrial development, providing a source of economic growth and conferring individual firms with distinctive strategic advantage. From a theoretical standpoint, innovation scholars should begin to develop a more complete conceptualization of design so that they understand and model the crucial roles of design in business, the economy, and wider society. They might begin by applying the five successive generations of innovation theories and models to design to see how the roles and processes of design have changed over time.[38] As Hatchuel argues, design should be at the heart of mainstream theories of innovation and growth.[39] However, Hatchuel, so far, is a lonely voice as he points innovation studies in this direction.

From an empirical perspective, new statistical evidence from innovation studies shows that design is one of the four main drivers of innovation and productivity in the United Kingdom, and probably in all advanced economies.[40] Indeed, design is more important to productivity and innovation than R&D, which is the usual focus

38   R. Rothwell, "Towards the Fifth-Generation Innovation Process," *International Marketing Review* 11:1 (1994), 7-31; J. E. Forrest, "Models of the Process of Technological Innovation," *Technology Analysis and Strategic Management* 3:4 (1991), 439-52; M. Hobday, "Firm-Level Innovation Models: Perspectives on Research in Developed and Developing Counties," *Technology Analysis & Strategic Management* 17:2 (2005), 121- 46.

39   Hatchuel, *Towards Design Theory.*

40   NESTA, The Innovation Index.

of both innovation studies and government policy initiatives and investments. Those in innovation studies should apply their substantive methods and measurement techniques to design in much greater detail, not only to assess the contribution of design to the economy and particular industries, but also to illustrate the diverse roles of design in different industrial and service sectors.

When they are more purposefully combined, design and innovation studies can offer convincing alternatives to the traditional view of the firm as a rational, machine-like entity. For its part, design thinking highlights the social and creative character of businesses and counters the dominant decision-making view of the firm. It provides us with ways of understanding the Gestalt or organizing patterns of innovative leaders.[41] Far too often, the rational, process-based, machine metaphor is the "default" position of innovation and technology management studies. Design thinking can lead to a major reorientation of innovation theory, research, and teaching, thereby moving toward a view of the firm as a creative, solutions-generating, social, and flexible organization.

This paper has focused primarily on the technical and business dimensions of innovation and design. However, we see that the wider application of design thinking goes beyond the technical and business domain to broader social, policy, and economic applications. Its main contribution is to offer new opportunities for problem-solving and solution generation through a collective social approach to wicked problems. This approach, based on design principles, not only challenges us intellectually but also promises to enhance mainstream management theory and education considerably by applying creative, dynamic, human-centered methods and techniques.

As suggested, one element from innovation studies that needs greater attention in design studies is design as a "capability." Innovation studies should bring its knowledge of capabilities to the field of design to expand design beyond its usual treatment as process, activity, or output. In design studies, the capability dimension tends to be overlooked in discussions of wicked problems. However, the wicked problem at hand only ever exists in relation to the capabilities of the group attempting to solve the design problem. With strong capabilities, the challenge of wicked problems are diminished and with weak or partial capabilities, the reverse is true. In this manner, the innovation field can help design studies understand the subjective dimension of wicked problems and how the relevant experience, knowledge, and skill that make up capability are acquired through design learning processes. Innovation studies could also help to identify how mechanisms for design learning can be enhanced and improved, and how to recognize when a design capability becomes a handicap (e.g. when designers rely on the wrong kind of previously accumulated capabilities to develop

41   Yoo et al., "From Organization Design to Organization Designing."

solutions to a new class of challenges). In these ways, innovation research can bring a very interesting new set of perspectives and insights into design sensing.

An innovation perspective can also allow us to understand the distinctiveness of design thinking as a solutions-oriented approach to management, showing how design thinking differs from the various other human-centred approaches to management. This way we could more clearly illustrate its distinctiveness as well as its strengths and weaknesses compared with other approaches. Such research would help contextualise design thinking within a wider historical, theoretical and managerial setting.

Another opportunity offered by a closer relationship between design thinking and innovation studies is in their application to small and micro-enterprises and entrepreneurial activity. The tendency, so far, has been to concentrate on large organizations. However, design thinking may shed fresh light on the issue of small and micro-enterprises, helping us to understand more fully the creative and social life of small firms through its human-centered lens. Emphasizing the human side of entrepreneurial activity overcomes the limitations of the traditional, more formal, process-based approaches that currently dominate in innovation studies.

These issues and challenges point to the possibility of a significant new research agenda arising from the combination of innovation and design studies. We have identified some of the synergies, but many others across the business, social, policy, economic, and developmental arenas are worth exploring. Our hope is that this paper stimulates interest not only in design/innovation research, but also in design/innovation theory and education.

Social Theory as a Thinking Tool for Empathic Design

Carolien Postma, Kristina Lauche, Pieter Jan Stappers

Figure 1a

Showing a personal SMS message to a friend is a way of communicating trust and friendship. See Alex S. Taylor and Richard Harper, "The Gift of the Gab?: A Design-oriented Sociology of Young People's Use of Mobiles," *Computer Supported Cooperative Work* 12:3, (2003): 267-96.

Figure 1b

When faced with buying wine in the supermarket, we often choose the bottle of wine from a nearly empty shelf, assuming it's the best one. See Thomas Erickson and Wendy A. Kellogg, "Social Translucence: An Approach to Designing Systems that Support Social Processes," *ACM Transactions on Computer-Human Interaction* 7:1 (2000): 59-83.

Figure 1c

In a people study about baby care (see section 5), dads with new-born children who were breast-fed, said they felt that their bond with the child was rather remote, because they didn't have any role in the breast feeding. In case of bottle-feeding, moms and dads would often feed the child in turns, or even together.

Figure 1d

Sometimes my dad gives me a ride to the bus station. When we are in a hurry, I jump into the back seat of the car. My dad doesn't like that: He says it makes him feel as if he's a taxi driver.

Figure 1e

The table arrangement in a restaurant influences how guests will interact during dinner and with whom. See William W. Gaver, "Affordances for Interaction: The Social is Material for Design," Ecological Psychology 8:2 (1996): 111-29.

Figure 1f

In a previous people study, a senior couple explained that every week, their friends would put six eggs up for raffle during their dancing classes. It was an exciting event, and all the people would bring their empty egg boxes, just in case...

Introduction

Recent societal issues and socio-technological developments, including the mass adoption of real-time social media services,[1] have made "the social" (i.e., the relationality inherent in human existence) an essential topic for design. Despite the fundamentally social nature of life, most existing models intended to generate perspectives of users in design still focus on the individual. To support designers in doing empathic design, we set out to find a possible conceptual framework that could serve as a "thinking tool" of the social. A model that sensitizes designers toward both relationality and individuality in building creative understanding of users for design. In this paper, we review a number of possible frameworks and describe our experiences in applying these frameworks in new product development (NPD) practice.

1   Contagious, "Most Contagious 2009," Contagious, www.contagiousmagazine.com (accessed December 19, 2009).

2   David Benyon, Phil Turner and Susan Turner, "Designing Interactive Systems: People, Activities, Contexts, Technologies" (Harlow: Pearson Education Ltd, 2005).

3   Examples are: Richard Buchanan, "Design Research and the New Learning," *Design Issues* 17:4 (Autumn, 1999): 3-23; Alison Black, "Empathic Design, User Focused Strategies for Innovation," *Proceedings of New Product Development*, IBC Conferences, (1998): 1-8; and Jane Fulton Suri and Matthew Marsh, "Scenario Building as an Ergonomics Method in Consumer Product Design," *Applied Ergonomics* 31 (2000): 151-7.

4   Katja Battarbee and Ilpo Koskinen, "Co-experience: Product Experience as Social Interaction," *Product Experience*, ed. Hendrik N. J. Schifferstein and Paul Hekkert (San Diego: Elsevier Ltd, 2008), 461.

5   Jane Fulton Suri, "Empathic Design: Informed and Inspired by Other People's Experience," Empathic Design, User Experience in Product Design, ed. Ilpo Koskinen, Katja Battarbee and Tuuli Mattelmäki (Edita: IT Press, 2003), 51; Ilpo Koskinen and Katja Battarbee, "Introduction to User Experience and Empathic Design," *Empathic Design, User Experience in Product Design*, ed. Ilpo Koskinen, Katja Battarbee and Tuuli Mattelmäki (Edita: IT Press, 2003), 37; and Elizabeth B.-N. Sanders and Uday Dandavate, "Design for Experiencing: New Tools," *Proceedings of the First International Conference on Design and Emotion* (Delft: Delft University of Technology, 1999): 87-91.

6   Carolien E. Postma, Kristina Lauche and Pieter Jan Stappers, "Trialogues: A Framework for Bridging the Gap Between People Research and Design," *Proceedings of Designing Pleasurable Products and Interfaces* (2009): 25-34.

7   Fulton Suri, "Empathic Design: Informed and Inspired by Other People's Experience," 51; Koskinen and Battarbee, "Introduction to User Experience and Empathic Design," 37; Sanders and Dandavate, "Design for experiencing: New Tools," 87-91.

In this paper we use "the social" to denote the idea that human activity is fundamentally social, as opposed to individual. Figure 1 presents six cases from daily life. A closer look at these cases reveals that the social plays an important role in each of these six cases, and that the social is more than just another flavor of context: The social permeates our lives. This idea has been at the core of computer-supported cooperative work but is only peripheral in design and design research.[2] The suggestion has been made in the design research literature that design teams need to establish creative understanding of the social to develop products and services that delight users.[3] However, most frameworks of user experience in design place the individual at the center and merely hint at the social, leaving design teams rather empty-handed, or at least ill-informed. Therefore, a theoretical framework is needed to sensitize designers toward the social in designing for user experience.[4]

Our work is situated in the context of empathic design in NPD practice.[5] Empathic design approaches often suggest that members of a design team (who may or may not be educated in design) adopt the role of people researchers and directly interact with users to ensure that the user perspective is included in design. However, in NPD practice, this interaction is not always feasible because people research is often outsourced or conducted by experienced people researchers. Alternatively, design teams might be engaged in analyzing and structuring the user experience data that have been gathered in people research.[6] Such an approach means that designers need conceptual tools that enable them to think about the social without having to become social scientists themselves. To guide multi-disciplinary design teams in making sense of user data for design, we searched for a thinking tool of the social. We dove into social theory, aiming not to develop a new model of the social, but to find a theoretical framework that design teams in practice could use as a thinking tool of the social in analyzing and structuring user experience data.

The paper proceeds in three parts. First, we explain the context of our search and identify search criteria. Second, we review five types of existing frameworks: special effect theories, relational frameworks, catalogues, metaphors, and scaffolds of context. In the third part, we focus on activity theory as having the best fit with design teams' needs, and show how we used it within an empathic design project in industry.

Criteria for Assessing Frameworks for Empathic Design in Practice
Empathic design is a relatively new branch of user-centered design approaches that support design teams in building creative understanding of users and their everyday lives for NPD.[7] The approach is considered most valuable in the fuzzy front end of NPD, when product opportunities need to be identified and product

8   Koskinen and Battarbee, "Introduction to User Experience and Empathic Design," 37.

9   Tuuli Mattelmäki, Design Probes, Doctoral Thesis (Helsinki: University of Art and Design Helsinki, 2006).

10 Elizabeth B.-N. Sanders, "Generative tools for codesigning," in *Collaborative Design*, ed. Stephen A. R. Scrivener, Linden J. Ball and Andree Woodstock (London): Springer-Verlag, 2000), 3.

11 Froukje Sleeswijk Visser and others, "Contextmapping: Experiences from Practice," *CoDesign* 1:2 (2005): 119-49.

12 Marion Buchenau and Jane Fulton Suri, "Experience Prototyping," in *Proceedings of Designing Interactive Systems* (New York: ACM Press, 2000): 424-33.

13 Katja Battarbee, Co-experience, Doctoral Thesis (Helsinki: University of Art and Design, 2004); Marc Steen, *The Fragility of Human-Centered Design*, Doctoral Thesis (Delft: Delft University of Technology, 2008).

14 Esko Kurvinen, Prototyping Social Action, Doctoral Thesis (Helsinki: University of Art and Design Helsinki, 2007).

15 Carolien E. Postma and others, "Doing Empathic Design: Experiences from Industry" (under review, 2011).

16 Jane Fulton Suri, "The Experience Evolution: Developments in Design Practice," *The Design Journal* 6:2 (2003): 39-48; Peter Wright and John McCarthy, "Empathy and Experience in HCI," in *Proceedings of Human Factors in Computing Systems* (New York: ACM Press, 2008): 637-46; Froukje Sleeswijk Visser, Remko Van der Lugt and Pieter Jan Stappers, "Sharing User Experiences in the Product Innovation Process: Participatory Design Needs Participatory Communication," *Creativity and Innovation Management* 16:1 (2007): 35-45.

17 Postma, Lauche and Stappers, "Trialogues: A Framework for Bbridging the Gap Between People Research and Design," 25-34.

18 Hugh Beyer and Karen Holtzblatt, Contextual Design: Defining Customer-centered Systems. (San Francisco): Morgan Kaufmann, 1998).

19 Veesa Jääskö and Tuuli Mattelmäki, "Observing and Probing," in *Proceedings of Designing Pleasurable Products*

concepts developed.[8] Empathic design uses a variety of methods and techniques, including design probes,[9] generative techniques,[10] context-mapping,[11] and experience prototyping.[12] These methods and techniques are typically design-led (as opposed to research-led) in that they focus on understanding and transforming users' experiences.[13] The idea is not to find the ultimate truth about people and their environment, but to build an understanding that enables designers to propose possible new futures.[14]

Based on a literature review, Postma, Zwartkruis-Pelgrim, Daemen, and Du identified four principles of empathic design:

1. Addressing people's rationality and their emotions in product use in a balanced way by combining observations of people's actions with interpretations of their thoughts, feelings, and dreams.
2. Making empathic inferences about prospective users, their thoughts, feelings, and dreams, and their possible futures of product use.
3. Involving users as partners in NPD, so that researchers and designers can continually develop and check their creative understanding in dialogue with users.
4. Engaging the design team members as multi-disciplinary experts in people research, thus encouraging researchers and designers to join forces in designing and conducting people research to ensure that the users' perspectives are included in NPD.[15]

The first two principals have implications for the qualities of the intended thinking tool of the social. The third and fourth principles determine the context in which the thinking tool of the social will be used. In NPD practice, direct interaction between users and all members of a design team is often not feasible. People research is often either outsourced or conducted by experts who may not be part of the design team; or it happens long before a design team is formed. As a result of these approaches, the user experience data need to be conveyed to the design team. The "rich" and "personal"—qualities of user data that are required for building creative understanding—are often lost in this process.[16]

A possible solution to sharing rich user data in design research practice is to engage the design team in analyzing and structuring the data after they have been pre-structured and pre-analyzed by the people researchers. By reading, interpreting, and explaining users' stories, team members make the data their own and build creative understanding of users' experiences.[17] To facilitate this process for designers, we searched for a conceptual framework as a thinking tool of the social.

Five criteria formed the starting point of our search. The first criterion was informed by empathic design's objective that understanding users' experiences should drive the development of

Footnote 19 *continued*
and Interfaces (2003), 126-31; Froukje
Sleeswijk Visser, Bringing the everyday
life of people into design, Doctoral
Thesis (Delft: Delft University of
Technology, 2009).

20 Benjamin B. Bederson and Ben
Shneiderman, *The Craft of Information
Visualization: Readings and Reflections*
(San Francisco): Morgan Kaufmann, 2003);
Ben Shneiderman, "Foreword," *in Human-
computer Interaction and Management
Information Systems: Foundations.
Advances in Management Innovation
Systems*, Volume 5, ed. Ping Zhang, Ben
Shneiderman and Dennis F. Galletta
(Armonk): M. E. Sharpe, Inc., 2006), ix.

21 Postma, Lauche and Stappers, "Trialogues:
A Framework for Bridging the Gap
Between People Research and Design,"
25-34; Sleeswijk Visser, *Bringing the
Everyday Life of People Into Design.*

22 Michael A. Hogg and Graham M.
Vaughan, *Social Psychology*, fourth
edition (London: Pearson Prentice
Hall: 2005).

23 Ibid.

24 Hall (1966) introduced the term
"proxemics" to refer to the study of
how people unconsciously structure their
immediate surroundings. One type of
spatial organization is "informal space,"
or "interpersonal distance." Interpersonal
distance is one way people use to
establish and maintain a desired level of
involvement in social interaction, e.g., in
greeting, caressing or conversing. Hall
distinguished four distance zones, ranging
from very close to the individual to further
away: An intimate zone, a personal zone,
a social zone, and a public zone. Which
zone people adopt depends on the context
of the social encounter; the setting, social
relationship and environmental conditions.
In some situations, people are not able
to adopt their preferred social distance,
for example, in an elevator or crowded
train, which may lead to discomfort.
See John R. Aiello, "Human Spatial
Behavior," in Handbook of Environmental
Psychology, ed. Daniel Stokols and
Irwin Altman (New York: John Wiley &
Sons, 1987), 359; and Robert B. Bechtel,
Environment and behavior: An introduc-
tion (Thousand Oaks): Pearson Prentice
Hall, 1997).

people-centered products and services. Sensitizing design teams to the social is not enough, however; designers also need to obtain a sense of how their designs relate to the social in envisioning possible futures of product use and in developing products and services that fit into people's social lives. Therefore, the framework needs to address the social in relation to the materiality of product use.

The second criterion was informed by the constraints of empathic design in NPD practice, in which not every design team member is experienced in people research. Because we potentially want to engage all team members in analyzing and structuring user data, the framework should provide experienced people researchers with (new) perspectives of the social, while also offering designers "handles" for the social. Such "handles" include Beyer & Holtzblatt's work models in the contextual design approach.[18] They provide a limited set of concrete themes or perspectives along which findings from people research can be organized. However, their models fall short as a thinking tool of the social in empathic design because contextual design mainly focuses on examining the rational domain.[19] Moreover, contextual design does not offer a theoretical framework that designers (and researchers) may use as a thinking tool in interpreting and explaining social practices.

Three further criteria were taken from Bederson and Shneiderman's classification of theories and frameworks.[20] They identify five categories: (1) descriptive frameworks that identify key concepts; (2) explanatory frameworks that explain relationships and processes; (3) predictive frameworks that help predict performance of people, organizations, or economies; (4) prescriptive frameworks that provide guidelines based on best practice; and (5) generative frameworks that support generating new ideas by providing ways of seeing what is missing and what needs to be done. The thinking tool we propose requires a framework that is descriptive of the social and material, explanatory of relationships and processes, and generative in terms of facilitating the identification of patterns and trends in user data and of opportunities for NPD. The framework also might be prescriptive in that it suggests ways of studying user experience data; however, these ways should not interfere with designers' established practices and cultures to such a degree that they keep designers from using the framework.[21]

Examination of Possible Frameworks
On the basis of the criteria identified, we examined frameworks in the literature and tried out candidate frameworks in NPD projects in industry. We began our search in social psychology and environmental psychology literature and then expanded the search to the human-computer interaction (HCI) and computer-supported cooperative work (CSCW) literature, where social frameworks are commonly used in studying collaborative work. Frameworks that, in terms of the criteria, appeared to be useful as a thinking

Table 1 *Overview of the criteria that evolved in the search process.*

Group	List of Criteria
	1. The framework needs to address the social in relation to the material;
	2. The framework needs to provide experienced people researchers with (new) perspectives of the social, and offer designers handles to the social in analyzing and structuring user experience data;
Relational frameworks	2.1. The framework needs to provide handles of the social in terms of variables or ingredients that design teams may use as anchor points in reading and interpreting user data;
	3. The framework needs to point out key concepts of the social and material that design teams need to pay attention to in building creative understanding of users' experiences;
Special effect theories	3.1 The framework needs to be holistic in scope to support design teams in building broad understanding of users' experiences in the early phases of NPD;
	4. The framework needs to offer design teams ways of interpreting and explaining user experience data by revealing relationships and processes of the social and material;
	5. The framework needs to facilitate seeing patterns and trends in user data, supporting design teams in generating user insights and identifying opportunities for design.
Metaphors of the social	5.1 The framework needs to support teams in taking user experience data to a higher level of understanding for identifying themes, patterns and trends in the data;
Metaphors of the social	6. The framework needs to offer multiple levels of description and explanation to support analysis of user experience data in different phases of an empathic design process;
Catalogues of the social	7. The framework needs to be generally applicable to support design teams in transforming as well as understanding users' experiences;
Metaphors of the social	8. The framework should allow for use in a half-day session;

tool of the social in empathic design were tried out together with multi-disciplinary design teams in industry. The researchers' and the teams' experiences in applying these frameworks led to new criteria, which in turn focused the search process.

The frameworks included in our study can be categorized into five groups: (1) special effect theories, (2) relational frameworks, (3) catalogues of the social, (4) metaphors of the social, and (5) scaffolds of context. An overview of the groups and our findings in terms of new search criteria is presented in Table 1 and discussed in the following paragraphs. The sequence in which the groups are discussed more or less delineates our search process.

Special Effect Theories
The first category covers special effect theories that highlight one or a few concepts regarding behavior in social or material contexts. We found many of these theories in environmental psychology and in social psychology, ranging from mini-theories, which apply to specific phenomena, to more general theories, which apply to classes of behavior.[22] An example of a mini-theory is the Ringelmann effect, which holds that an individual's effort in a task decreases when group size increases.[23] Two examples of more general theories are proxemics and social identity theory.[24]

Footnote 24 *continued*

personal or social identity that is most salient at a given time shapes our concept of self and corresponding behavior. See Hogg and Vaughan, Social Psychology, fourth edition.

25 Benyon, Turner and Turner, "Designing Interactive Systems: People, Activities, Contexts, Technologies."

26 Carolien E. Postma and Pieter Jan Stappers (2006), "A Vision on Social Interactions as the Basis for Design," *CoDesign*, 2:3, 139-55.

27 Situated action studies the relation between acting individuals and their changing environment. The term "situated action" was first introduced by Lucy Suchman in her book "Plans and Situated Actions" (1987) to stress the emergent, improvisatory character of people's activities. The book is a critical response to the information-processing paradigm, which models people as cognitive systems that pursue action after having set goals and having developed plans. Suchman, taking an ethnomethodological stance, argued that the structure of activity is not planned, but evolves in response to real-world situations that are inherently dynamic. Suchman does recognize the existence of plans, but merely as one of several resources within the situation that may shape an activity. Goals, she argues, are defined in retrospect. Suchman uses the example of canoeing in explaining the idea of Situated Action: "*In planning a series of rapids in a canoe, one is very likely to sit above the falls and plan one's descent. (…) But, however detailed, the plan stops short of the actual business of getting your canoe through the falls. When it really comes down to the details of responding to currents and handling a canoe, you effectively abandon the plan and fall back on whatever embodied skills are available to you.*" See Lucy A. Suchman, Plans and situated actions: The problem of human machine communication (New York): Cambridge University Press, 1987); and Bonnie Nardi, "Studying Context: A Comparison of Activity Theory, Situated Action Models and Distributed Cognition," *Context and Consciousness: Activity Theory and human-computer interaction*, ed. Bonnie A. Nardi (Cambridge: MIT Press, 1996), 69.

In HCI and design, special effect theories have been successfully used to envision how products and services might affect social practices and to confirm findings from people research.[25] In a design project about teens' cliques, for example, the people researchers consulted literature about group structures to determine whether they had overlooked roles in teens' cliques.[26] In a project about baby care, the people researchers used literature about parenting styles to develop criteria for segmentation of families. However, we found that special effects theories were not particularly helpful thinking tools of the social in developing a broad understanding of users' experiences as a starting point for identifying opportunities for product and service development, because they only address part of human behavior in context. This finding led to a new search criterion: *The framework should be holistic in scope to support design teams in building broad understanding of users' experiences in the early phases of NPD* (criterion 3.1).

Relational Frameworks

Relational frameworks describe the nature of the relationships between people and their environment. They are generic frameworks in the sense of conceptual approaches or theoretical perspectives. Three examples of relational frameworks are situated action,[27] behavior settings theory,[28] and Gibson's theory of affordances.[29] In addition, actor network theory and Battarbee & Koskinen's framework of co-experience may be seen as falling into this category.[30]

For social scientists, relational frameworks have provided new perspectives on studying and interpreting human behavior. Stressing the improvisational nature of human action, situated action invited researchers to study the moment-by-moment organization of an activity in real settings. Behavior settings theory introduced the idea of environmental units that direct human behavior and prompted researchers to identify and study relations between extra-individual patterns of behavior and settings that are specified in time and place. The concept of affordances provided a lens to look at relations between properties of an environment and individuals' history, abilities, and intentions.

For designers, however, these relational frameworks are generally more difficult to apply because they typically do not offer "handles" of the social. They provide only very limited guidance as to what aspects of behavior and environment should be considered in studying social phenomena because the frameworks do not specify variables or ingredients of the social. That designers seek this guidance is nicely illustrated by the shift of meaning of Gibson's concept of affordances in HCI and design, where an operational redefinition has evolved that sees affordances as "opportunities for action suggested by an object," which is far removed from its original meaning. We therefore concluded that *the thinking tool of*

28 Behavior Settings theory focuses on the relationship between extra-individual behavior and environmental units. From detailed field observations Barker (1968) found that human behavior is not randomly distributed across time and space; "*the inhabitants of identical ecological units exhibit a characteristic overall extra-individual pattern of behavior*," he argued (Barker, 1968). In a school class, for example, teacher and students behave "school class." In the supermarket people, including the teacher of the school class, behave "supermarket." And during a meeting of the teachers of the school, the teachers behave "staff meeting." Barker called the physical-behavioral units "behavior settings." Behavior settings are "*stable, extra-individual units with great coercive power over the behavior that occurs within them.*" See Roger G. Barker, Ecological Psychology: Concepts and methods for studying the environment of human behavior (Stanford: Stanford University Press, 1968).

29 Gibson proposed an ecological approach to perception. In his book *'The Ecological Approach to Perception'* (1979), he described a new paradigm for understanding human activity in context, focusing not on the actor and (part of) his/her environment as independent things, but rather on the relations between actor and environment. He introduced the term "affordances" to mean the full set of potential actions that an environment holds in store for a particular actor. For example, a ladder affords an adult to climb up and down, but it does not afford a baby to climb up and down. Information about affordances is available to the actor's senses. The actor's attunement to particular affordances is determined by his/her needs and intentions, personal history and context. See James J. Gibson, The ecological approach to visual perception (Boston: Houghton Mifflin, 1979); and Gerda Smets, Vormleer: De paradox van de vorm (Amsterdam: Uitgeverij Bert Bakker, 1986). Several people have elaborated on Gibson's concept of affordances for understanding the social. Gaver, for example, introduced the term "Affordances for Sociality" to

the social should provide "handles" of the social, which are the variables or ingredients that design teams may use as anchors in reading and interpreting user data (criterion 2.1).

Catalogues of the Social

"Catalogues" in this case means the maps of people's behavior in their social and material contexts. Such maps often are developed on the basis of personal experience and/or empirical research. Seminal work in this regard is the concept of pattern language proposed by Alexander, Ishikawa, and Silverstein.[31] The book offers a typology of solutions that architects might incorporate in the development of towns and buildings. The typology is presented as a system of patterns that describe relationships between people and their surroundings and that were developed based on years of experience with building and planning. Each pattern, in essence, reports a problem, the context in which the problem occurs, and a solution to the problem. For example, in the context of designing a family home, Alexander et al. suggest that architects may address the problem of creating quiet and private spaces for parents by designing the family home in such a way that the continuum of spaces where children live and play does not include the parents' realm.[32]

In HCI and CSCW, social scientists have seized the idea of a pattern language as a way to structure and document ethnographic field data and to produce guidelines for design that transcend the particularities of the data, but that are still grounded in the real world.[33] Crabtree, Hemmings, and Rodden, for example, have developed a framework for identifying patterns of social action and technology use in domestic settings.[34] Martin, Rodden, Rouncefield, Summerville, and Viller have used patterns from ethnographic user research to inform the development of computer systems.[35]

For our goal of developing patterns for considering the social in empathic design, we had neither decades of experience from practice nor extensive field data to rely on. In addition, because patterns are context-specific, they might not be helpful in envisioning radically new situations of product and service use in empathic design. A framework for the social in empathic design needs to be generally applicable to various situations of product and service use, including situations that do not yet exist.

A possible solution to both issues is to take a "top-down" approach, rather than a "bottom-up" approach in developing patterns. Kelley, Holmes, Kerr, Reis, Rusbult, and Van Lange's "An atlas of interpersonal situations" is a good example of a pattern language that was developed using a top-down approach.[36] They developed patterns by describing and analyzing common social situations using one theoretical framework: interdependence theory. The resulting atlas presents both the framework and the patterns. Kelley et al.'s atlas does not address the social in relation to the material, but the idea of combining both a framework and patterns

Footnote 29 *continued*

refer to the possibilities offered by the physical environment for social activity. An example of affordance of sociality is the table setting presented in figure 1. See Gaver, "Affordances for Interaction: The Social is Material for Design," 111-29. Valenti and Good used Gibson's ecological approach to perception as a framework for studying social interaction. They introduced the term "Social Affordances," meaning the possibilities for action that people offer one another, and the role of other people in pointing out new affordances. People may, for example, afford one another comforting, fighting, or play. See Stavros S. Valenti and James M. M. Good, "Social Affordances and Interaction I: Introduction," *Ecological Psychology* 3:2 (1991): 77-98.

30 Bruno Latour, Reassembling the Social: An Introduction to Actor-Network Theory (Oxford: Oxford University Press, 2005); Katja Battarbee and Ilpo Koskinen, "Co-experience: User experience as interaction," *CoDesign* 1:1 (2005): 5-18.

31 Christopher Alexander, Sara Ishikawa and Murray Silverstein, *A Pattern Language* (New York: Oxford University Press, 1977).

32 Ibid.

33 John Hughes and others, "Patterns of Home Life: Informing Design for Domestic Environments," *Personal and Ubiquitous Computing* 4:1 (2000): 25-38.

34 Andy Crabtree, Terry Hemmings and Tom Rodden, "Pattern-based Support for Interactive Design in Domestic Settings," in *Proceedings of the 4th Conference on Designing Interactive Systems* (New York: ACM Press, 2002): 265-76.

35 David Martin and others, "Finding patterns in the fieldwork," in *Proceedings of the 7th Conference on European Conference on Computer Supported Cooperative Work* (Norwell: Kluwer Academic Publishers, 2001), 39-58; David Martin and others, "Patterns of Interaction: A Pattern Language for CSCW," www.comp. lancs.ac.uk/research/projects (accessed August 4, 2010).

36 Harold H. Kelley and others, An atlas of interpersonal situations (Cambridge UK: Cambridge University Press, 2003).

is interesting because it provides both the perspectives and the handles to the social that we are looking for: It offers a thinking tool of the social that enables design teams to envision radically new situations of product and service use that go beyond the scope of the context-specific patterns, as well as concrete examples of the social in terms of patterns that help design teams think about the framework. Such patterns could be developed once a suitable framework has been found.

As a new search criterion, we conclude that *the framework needs to be generally applicable to support design teams in both understanding and transforming users' experiences* (criterion 7).

Metaphors of the Social: The Theatrical Metaphor

The third category is metaphors. Metaphors are used for understanding one concept in terms of another. In the field of design, two important uses of metaphor may be distinguished: (1) metaphor as an expressive tool,[37] of which the desktop metaphor in computing is a well-known example; and (2) metaphor as a generative instrument, which means transferring the structure of one concept to the other to develop new ways of seeing both concepts.[38]

The latter sense of metaphorical thinking is also used in social sciences in interpreting and explaining social phenomena. Taylor and Harper, for example, used Mauss's metaphor of gift-giving to interpret their observations of teenagers' text messaging practices.[39] Other examples of metaphors used as generative instruments in social sciences are game metaphors, such as the prisoner's dilemma and the theatrical metaphor.[40] For us, Goffman's use of the theatrical metaphor is of particular interest.

Goffman, a sociologist and important contributor to symbolic interactionism, is renowned for his dramaturgical analysis of social encounters.[41] In "The presentation of Self in everyday life," he used the theatrical metaphor as a framework in analyzing and explaining the structure of social encounters, viewing the world as a stage, people as actors, and social interaction as drama.[42] The metaphor prompts questions such as: Who is the performer, and who is the audience? What is front stage, and what is back stage? What does the décor look, hear, smell, and feel like? What are the plot outline and the run time of the performance? Which tools of expression are used in the performance, and for which goal? What are the (social) roles of the performers? What are the performers' motivations, emotions, beliefs, and attitudes in relation to the performance? How are the performers' behaviors on stage different from their behaviors backstage?

Examining metaphors on the basis of literature suggests that Goffman's framework would be an excellent thinking tool of the social for empathic design: The framework is holistic in scope; identifies key concepts and ingredients of the social and material (e.g., "front stage-back stage" and "tools of expression"); and

Figure 2

In a user insights session about social presence, Goffman's theatrical metaphor was used to structure observations and findings from people research. The metaphor raised interesting discussions about the scope of the project. But did not support the design team in building broad understanding of users' experiences of social presence, as the designers' observations and findings from people research did not deliver the kind of detail required by the metaphor.

37 Thomas J. L. Van Rompay, *Expressions: Embodiment in the Experience of Design*, Doctoral Thesis (Delft: Delft University of Technology, 2005).

38 Donald A. Schön, D. A., *Displacement of Concepts* (London): Tavistock Publications, 1963); Hernan P. Casakin, "Assessing the Use of Metaphors in the Design Process," *Environment and Planning B: Planning and Design* 33:2 (2006): 253-68.

39 Taylor and Harper, "The Gift of the Gab?: A Design-oriented Sociology of Young People's Use of Mobiles," 267.

40 Daniel Rigney, *The Metaphorical Society: An Invitation to Social Theory* (Landham): Rowman & Littlefield Publishers, Inc., 2001).

41 Joel M. Charon, Symbolic Interactionism: An introduction, an interpretation, an integration, eight edition (Englewood Cliffs): Pearson Prentice Hall, 2004).

42 Erving Goffman is considered to be an important contributor to Social Interactionism, a major sociological perspective that focuses on the process of meaning making in social interaction. In "The presentation of Self in everyday life," Goffman uses the metaphor of theoretical performance as a framework in explaining and analyzing the structure of social encounters between people. He views the world as a stage, people as actors and social interaction as drama. *"The world is not, of course, a stage, but the crucial ways in which it isn't are not easy to specify,"* Goffman (1959) maintains. Key factor in this structure, Goffman argues, is the process of developing and maintaining a shared understanding of a situation, including Self (i.e., impression management). *"Each person in everyday social intercourse*

reveals relationships and processes (e.g., "performance" and "script"). It is already widely used as generative instrument in social sciences, and we thought it might be used as generative instrument in design thinking as well. However, when we tried out the metaphor as thinking tool of the social in projects in industry, we found otherwise.

We applied the theatrical metaphor as thinking tool of the social in user insight sessions in three different NPD projects in industry. The aim of the sessions was to build creative understanding of users' experiences as a starting point for developing opportunities for design. In the first project, the team members used the metaphor to structure their observations and findings from people research (see Figure 2). In the second project, the team members used the metaphor in reviewing their interpretations of user experience data. In the third project, the team used the metaphor in developing scenarios based on their analysis of user experience data.

Our experience with the theatrical metaphor as thinking tool showed that it raised interesting discussions of the social, but it was not a helpful thinking tool in the early, exploratory phases of NPD. Three important findings from the cases informed our further search: First, the metaphor did not support broad exploration of users' needs and contexts. The NPD teams were concerned with drawing the big picture, which contains many performances, before choosing a particular focus for their projects. However, the theatrical metaphor already required the teams to focus on one specific performance or action in the user data and to analyze this performance in detail, leaving off the radar other potentially interesting parts of the user data.

Second, the metaphor did not support the need to identify patterns and trends in the data. The teams needed to develop a higher-level, a more general understanding of the user data to generate user insights and develop opportunities for design. But the theatrical metaphor led the teams to delve into the complexity of the social within the boundaries of one case.

Third, the theatrical metaphor required too much time to understand and apply in the context of a user insights session. The team members of the third project indicated that they preferred not to use the metaphor because they thought it was too difficult to grasp within the time frame of an insights session. Similarly, in the first project, the metaphor often put team members out of their depth in a way that paralyzed the creative process. Three new criteria were drawn from these findings:

- *The framework needs to offer multiple levels of description and explanation to support analysis of user experience data in different phases of an empathic design process* (criterion 6).
- *The framework should support teams in taking user experience data to a higher level of understanding for identifying themes, patterns, and trends in the data* (criterion 5.1).
- *The framework should be applicable within a limited time, such as a half-day session* (criterion 8).

Scaffolds of Context: Activity Theory

Our search concluded with activity theory (AT). AT is a framework for describing and explaining the structure, development, and social-cultural context of people's activities. The framework points out concepts of the social and the material that we need to take into account in developing an understanding of the what, how, and why of people's behavior in their social-cultural context.[43] It spurs questions such as: What is the activity? Who are the people involved in the activity? Why do they do the activity (i.e., what is their objective)? What actions and operations do they do in pursuing the objective? What tools do the people use in achieving the objective? How do these tools mediate their activity? What roles do the people have in pursuing the objective? How do the people work together in the activity; what are their rules, norms, and procedures? How does the activity develop over time?

Activity Theory in a Nutshell

Although called a theory, AT is best described as paradigm of human activity.[44] AT has its roots in early twentieth century Russia, where its first foundations were laid by Lev Vygotsky in developing his cultural-historical psychology.[45] AT was further developed into a conceptual framework by his colleague, Alexei Leont'ev.[46] Only in the early 1980s, after seminal work on AT had been published in English, did the conceptual framework become known internationally. In 1987, Yrjö Engeström presented a framework of human activity in a social-cultural context that builds on Leont'ev's AT.[47]

Two fundamental ideas lie at the heart of AT: (1) "Unity of consciousness and activity," which is the idea that the human mind can only be understood in the context of people's interaction with

Figure 3
Engeström's model of an activity system
(adapted from Yrjö Engeström, "Expansive
Learning at Work: Toward an activity theoreti-
cal reconceptualization," 133-56.)

Footnote 42 *continued*
  and setting tools, e.g., stage props,
  physical lay-out and scenery.
- Social role — Each performer has a
  particular social role, e.g., the role
  of "father," "manager," or "teacher."
  Social roles involve one or more parts,
  or "routines." A part is a pre-established
  pattern of action that is unfolded during a
  performance. The performer may play the
  same part on different occasions.

43 Kari Kuutti, "Activity Theory as a
potential framework for human-computer
interaction research," in *Context and
Consciousness: Activity Theory and
human-computer interaction*, Bonnie A.
Nardi (Cambridge): MIT Press, 1996), 17.

44 Benyon, Turner and Turner, "Designing
Interactive Systems: People, Activities,
Contexts, Technologies."

45 Lev S. Vygotsky, Thought and Language
(Cambridge: MIT Press, 1962).

46 Aleksie N. Leont'ev, Activity,
Consciousness, and Personality
(Englewood Cliffs: Prentice-Hall, 1978).

47 Yrjö Engeström, Learning by Expanding:
An Activity-Theoretical Approach to
Developmental Research, (Helsinki:
Orienta-Konsulit, 1987); Yrjö Engeström,
"Expansive Learning at Work: Toward an
Activity Theoretical Reconceptualization,"
Journal of Education and Work 14:1
(2001): 133-56; Victor Kaptelinin and
Bonnie Nardi, Acting with Technology
(Cambridge: MIT Press, 2006);
Kari Kuutti, "Artifacts, activities,
and design knowledge," in *Design
Integrations: Research and Collaboration*,
ed. Sharon Poggenpohl and Keiichi
Sato (Chicago: Intellect Ltd., 2009), 67.

48 Kaptelinin and Nardi, Acting with
Technology; Victor Kaptelinin, Bonnie
Nardi and Catriona Macaulay,
"The Activity Checklist: A Tool for
Representing the 'Space' of Context,"
Interactions 6:4 (1999): 27-39.
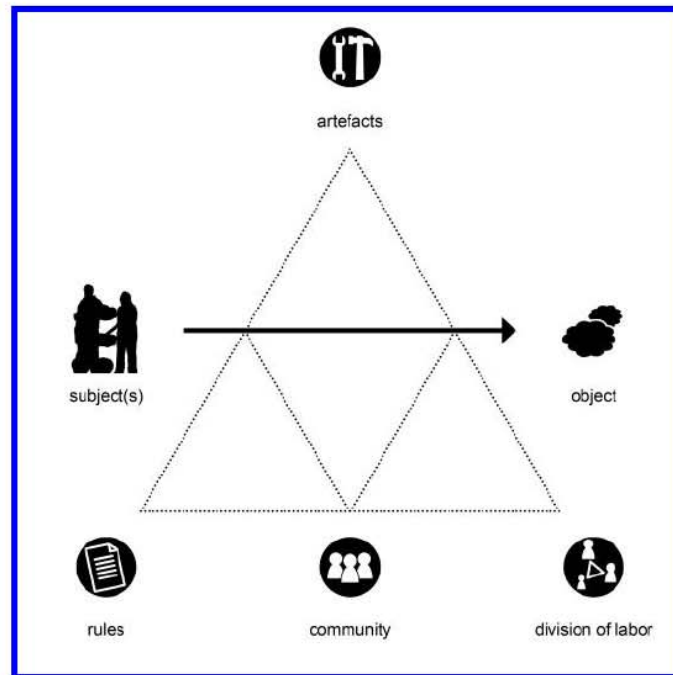
the world; and (2) "social nature of the human mind," which means
that human interaction, or "activity," is situated in and shaped
by social and cultural context.[45] AT thus transcends dichotomies
between mind and world and between individual and social.

Figure 3 shows Engeström's model of an activity system.[49]
The activity system is the basic unit of analysis in AT. The model
includes six components: subject (an individual or group), object
(or objective), mediating artifacts, rules, community, and division
of labor. The upper half of the triangle basically represents the
material context of an activity and the lower half the social context.
The horizontal arrow in the center of the model symbolizes human
activity. The activity system is framed by five basic concepts: object-
orientedness, activity hierarchy, internalization and externalization,
mediation, and historicity and development. The concepts each
address one part of the activity system. AT argues that all five
concepts need to be considered in developing understanding of
an activity system. We use the example of baby care to explain the
five concepts in greater depth. In this example, the subjects (i.e.,
the people engaged in the activity) are first-time parents Mark and
Laura, and the activity is caring for their baby, Roos.

The first concept is *object-orientedness*. Human activity is
always directed toward an "object." Objects motivate and direct
activities; they appeal to the subjects' needs and desires. Originating
from its German and Russian roots, the term "object" incorporates
two meanings—namely the (physical) object one is seeking to

transform in the activity (e.g., the stone that a sculptor is shaping) and the objective that one is aiming to achieve (e.g., the sculpture that the artist has in mind while shaping it).[50] Mark and Laura's object of baby care is a healthy and happy baby Roos. Mark and Laura's community of baby care includes their parents, their close friends Bram and Marije, the daycare center, and the child health center. The concept of object-orientedness helps us to develop understanding of the ultimate "why" of their actions in caring for baby Roos.

Note that from an AT perspective, exploratory design research should not be about uncovering people's latent needs, but about following objects that motivate people's activities. This perspective may shed a different light on the development of tools and techniques that are frequently used in empathic design, such as design probes,[51] generative techniques,[52] and experience prototyping.[53]

The second concept is *activity hierarchy*. An activity can be deconstructed into actions and lower-level operations. Actions (similar to "tasks" in HCI) are directed toward goals (e.g., constructing a sentence to convey a message). Actions and goals are conscious. Operations, meanwhile, are routinized or automated behavioral routines and are typically unconscious (e.g., typing, or switching gears when driving). Caring for baby Roos involves both actions and operations, including singing a lullaby, changing her diapers, taking her to the health center, and getting up at night to feed her.

The levels of an activity are not fixed. Actions may become automatic operations, and operations may become conscious actions. In the case of Mark and Laura, for example, changing diapers used to be a conscious action, but then it gradually turned into a routine operation with practice. At one point, the operation of changing diapers had become a conscious action again when Mark had mistakenly bought diapers that are fastened in a different way.

The third concept is *internalization and externalization*. AT distinguishes between internal, mental activities and external activities and argues that one cannot be understood without the other because they transform and influence one another.[54] External activities become internalized when people learn to do an activity in the head without using any physical aids. To illustrate, Mark and Laura initially needed to figure out what made Roos cry. After a few weeks, they started to recognize and distinguish her cries and immediately knew what action to take. Internal activities are externalized when an activity is too difficult to do without physical aids, when the activity does not turn out right, or when people need to coordinate the activities in working together. For example, Roos was ill and wouldn't stop crying, despite all efforts to comfort her.

49 Engeström, "Expansive Learning at Work: Toward an Activity Theoretical Reconceptualization," 133.

50 Victor Kaptelinin, "The Object of Activity: Making Sense of the Sense-Maker," *Mind, Culture and Activity* 12:1 (2005): 4-8; Yrjö Engeström and Frank Blackler, "On the Life of the Object," *Organization* 12:3 (2005): 307-30.

51 Mattelmäki, *Design Probes*, Doctoral Thesis.

52 Sanders, "Generative tools for codesigning," 3-12.

53 Buchenau and Fulton Suri, "Experience Prototyping," 424-33.

54 Vygotsky, *Thought and Language*.

55 Kaptelinin and Nardi, *Acting with Technology* 2006; Kaptelinin, Nardi and Macaulay, "The Activity Checklist: A tool for representing the 'space' of context," 27-39; Kuutti, "Activity Theory as a potential framework for human-computer interaction research," 17; Engeström, "Expansive Learning at Work: Toward an Activity Theoretical Reconceptualization," 133-56; Nardi, "Studying Context: A Comparison of Activity Theory, Situated Action Models and Distributed Cognition," 69-102.

56 Susanne Bødker, "Applying Activity Theory to Video Analysis: How to Make Sense of Video Data in Human-computer Interaction," in *Context and Consciousness: Activity Theory and Human-computer Interaction*, ed. Bonnie A. Nardie (Cambridge: MIT Press, 1996), 147; Kuutti, "Activity Theory as a Potential Framework for Human-computer Interaction Research," 17; Bonnie Nardi, "Activity Theory and Human-computer Interaction Research," in *Context and Consciousness: Activity Theory and human-computer interaction*, ed. Bonnie A. Nardi (Cambridge: MIT Press, 1996), 7.

57 Examples are: Patricia Collins, Shilpa Shukla and David Redmiles, "Activity Theory and System Design: A View From the Trenches," *Computer Supported Cooperative Work* 11:1 (2002): 55-80; Morten Fjeld and others, "Physical and Virtual Tools: Activity Theory Applied to the Design of Groupware," *Computer Supported Cooperative Work* 11 (2002): 153-80; and Kristina Lauche, "Collaboration Among Designers: Analysing an activity for system development," *Computer Supported Cooperative Work* 14 (2005): 253-82.

58 For example: Mervi Hasu, *Critical Transition from Developers to Users,* Doctoral Thesis (Helsinki: University of Helsinki, Department of Education, Center for Activity Theory and Developmental Work Research, 2001); and Sampsa Hyysalo, Uses of innovation: Wristcare in the practices of engineers and elderly, Doctoral Thesis (Helsinki: University of Helsinki, Faculty of Behavioral Sciences, 2004).

At first, Mark and Laura did not understand what was wrong; they again needed to figure out why Roos was crying and what action to take.

The fourth concept is *mediation*. People's activities are mediated by artifacts, the division of labor, and rules. All three form more durable structures that persist across activities, time, and place. The durable structures shape activities and at the same time are developed and transformed in activities. They reflect the experiences of others who have pursued similar objectives or goals. Artifacts, or "tools," are thinking tools as well as physical tools that the subject uses in pursuing his/her object. Mark and Laura's tools of baby care include a comforting lullaby, Roos' bedroom, her favorite teddy bear, and a playpen. Rules refer to implicit and explicit norms and conventions that govern the relationship between the subjects and their community. For example, the child health care center, which is part of Mark and Laura's community of baby care, advised Mark and Laura to build up a strict day routine for the baby that follows a sequence of four actions: feeding, playing, sleeping, and taking time for yourself. Mark and Laura are now trying to develop and adhere to such a routine. Division of labor is the organization of the subjects and their community in terms of roles and responsibilities. Laura usually brings Roos to bed. She tries to establish a bedtime routine by feeding Roos upstairs just before bedtime. Mark thinks it is too much trouble to feed Roos upstairs, so he leaves this up to Laura. In the meantime he does some household activities.

The fifth concept is *historicity and development*. Activities change and develop over long periods of time, and understanding an activity requires tracing how the activity has developed in the past. Contradictions (or tensions) within or between activity systems are sources of change and development.[55] In Mark and Laura's case, a contradiction between subjects and community led to a change of action: Mark and Laura changed Roos' sleeping routine after friends pointed out that Roos may get used to sleeping in her parents' bedroom and may not learn to sleep on her own.

AT as Thinking Tool of the Social for Empathic Design

Prominent researchers in HCI and CSCW, including Suzanne Bødker, Kari Kuutti, Victor Kaptelinin, and Bonnie Nardi, have propagated AT as a framework for HCI research and interaction design.[56] AT has been used in a number of cases to analyze ethnographic data and formulate design requirements for social computing.[57] Some colleagues of Engeström have also used AT to study design practice and the effect of products on people.[58] In both design research and design practice, however, AT is still relatively unknown. Yet our examination of the literature suggests that AT could be a very powerful thinking tool of the social for doing empathic design in NPD practice:

- AT addresses the social in relation to the material (criterion 1). Unlike most theories in psychology, the framework accounts for artifacts. And unlike many approaches in the human factors discipline, the framework addresses social practice, as well as individual behavior.[59] Using AT could therefore help design teams to get a sense of how the products they design relate to people's social practices.
- The framework identifies components of the social and the material (e.g., division of labor and rules) that design teams can use as anchors in reading and interpreting user experience data (criterion 2.1). As studies in HCI and CSCW have demonstrated, AT also provides experienced people researchers with (new) perspectives of the social in analyzing and structuring user data (criterion 2).[60]
- AT provides a comprehensive framework that emphasizes key concepts of the social and the material that design teams need to pay attention to in structuring and analyzing user experience data (e.g., mediation and object-orientedness) (criteria 3 and 3.1).
- The framework offers design teams ways of interpreting and explaining user experience data by revealing relationships and processes, such as the dynamic levels of an activity, historicity and development, and internalization and externalization (criterion 4).
- AT supports design teams' efforts to take user experience data to a higher level of understanding and to identify themes, patterns, and trends in the data. The idea of contradictions can also help to identify opportunities for product and service design (criteria 5 and 5.1).
- AT offers three levels of description and explanation (i.e., activity level, action level, operation level), supporting design teams in building broad understanding of users' experiences in the early phases of NPD, as well as more in-depth understanding in later phases of NPD (criterion 6).
- Design teams can apply AT in building creative understanding of various activities and contexts, including future situations of product and service use (criterion 7).

The only criterion that AT does not meet is that of allowing for use under the time constraint of a half-day session (criterion 8). AT is often considered hard to learn and difficult to put into practice.[61] Given this reputation, we cannot expect design teams in practice to understand and use AT in a way that social scientists do. Thus, the framework needs to be translated into more intuitive ways of building creative understanding of users' experiences for design. In the next section, we present an example of how we applied AT in an NPD project.

59   Frank Blackler, "Knowledge, Work and Organizations: An Overview and Interpretation," *Organization Studies* 16:6 (1995): 1021-46; Yrjö Engeström, "Activity theory as a framework for analyzing and redesigning work," *Ergonomics* 43:7 (2000): 960-74.

60   Examples are: Bødker, "Applying Activity Theory to Video Analysis: How to Make Sense of Video Data in Human-computer Interaction," 147-74; Collins, Shukla and Redmiles, "Activity Theory and System Design: A View From the Trenches," 55-80; and Phil Turner, Susan Turner and Julie Horton, "From Description to Requirements: An Activity Theoretic Perspective," *Proceedings of the International ACM SIGGROUP Conference on Supporting Group Work* (New York: ACM Press, 1999), 286-95.

61   Nardi, "Activity Theory and Human-computer Interaction Research," 7; Benyon, Turner and Turner, "Designing Interactive Systems: People, Activities, Contexts, Technologies."
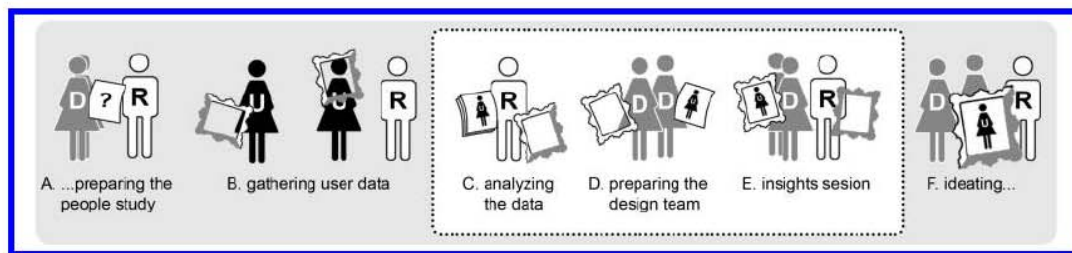
Figure 4
The empathic design process that we followed in the baby care project. The people researcher (puppet marked by "R") gathered user experience data in dialogues with parents (U) during the first half of the process. In the second half of the process the people researchers analyzed and structured the user data. The people researchers facilitated the process with the help of representations (frames), such as probes, generative tools and preparation kits.

A. ...preparing the people study   B. gathering user data   C. analyzing the data   D. preparing the design team   E. insights sesion   F. ideating...

Activity Theory as a Thinking Tool of the Social in an NPD Project
We translated and applied AT as a thinking tool of the social in an NPD project focused on baby care. Undertaken at Philips Research Europe, the project was intended to develop new technologies and product concepts for baby care, based on rich understanding of the lives of parents with babies. The design team consisted of six experienced designers with backgrounds in electrical engineering, computer science, psychology, and industrial design. The first author of this paper and one team member participated in the role of people researcher.

Figure 4 presents an outline of the empathic design process that we followed in the baby care project. The next subsection describes phases C (i.e., analyzing the data), D (i.e., preparing the design team), and E (i.e., insights session) of the process. In these phases, AT was used in building creative understanding of parents and baby care.[62]

Use of Activity Theory in the Baby Care Project
In the analysis phase (phase C in Figure 4), we (i.e., the people researchers) used AT as a thinking tool in structuring and analyzing user data. Initially we had followed an affinity diagramming approach in structuring and interpreting the user data: We annotated the data with observations and comments, put the annotated data on cards, and grouped the cards to identify themes.[63] When groupings started to overlap in multiple ways, we decided to use the AT framework instead.

First, we formulated high-level activities (e.g., establishing a routine for the baby) and lower level actions (e.g., getting the baby to sleep) on the basis of the previous groupings. Then, we developed models of the activity and actions for each family by sorting the annotated data using Engeström's model of an activity system, as shown in Figure 5.[64] Patterns and contradictions were identified within and between activity systems. Finally, a preliminary typology of families was developed based on the parents' rules of baby care (i.e., "parenting styles"). Theories of parenting styles helped us to further specify the criteria for segmentation.

62   For a description of the whole empathic design process, see Postma, Lauche and Stappers, "Trialogues: A Framework for Bridging the Gap Between People Research and Design," 25.

63   Nandini P. Nayak, Debbie Mrazek and David R. Smith, "Analyzing and Communicating Usability Data: Now That You Have the Data What Do You Do?," *ACM SIGCHI Bulletin* 27:1 (1994): 22-30; Karen Holtzblatt, Jessamyn Burns Wendell and Shelley Wood, *Rapid Contextual Design: A How-to Guide to Key Techniques to User-centered Design* (San Francisco: Morgan Kaufmann, 2005).

64   Yrjö Engeström, *Learning by Expanding: An Activity-Theoretical Approach to Developmental Research.*
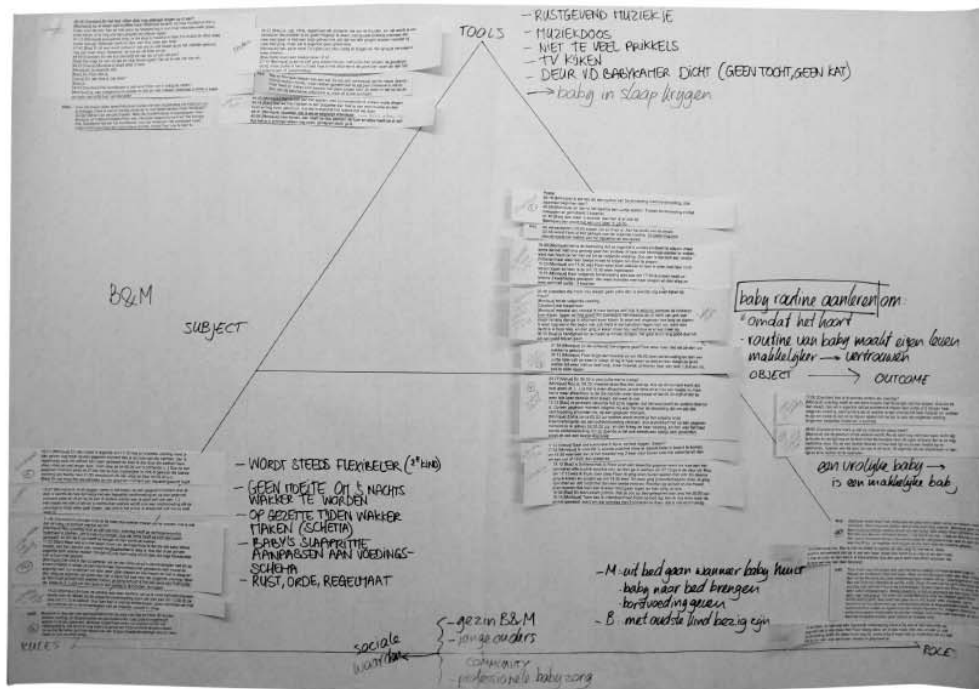
Figure 5
The people researchers developed models of the parents' activity and actions by sorting the annotated user data using Engeström's model of an activity system (Figure 3).

Figure 6
The people researchers developed preparation kits for sharing the user experience data with the design team (left). The designers worked on the preparation kits individually, and then participated in a joint insights session in which they shared their observations and findings from working on the kits (center), and created maps of parents' current situations on posters (right).

In the communication phase (phases D and E), we used the AT framework as a thinking tool for sharing the user data with the designers, who in turn implicitly used the framework in reading and interpreting the user data. We developed three different preparation kits for sharing the user data with the design team. Each kit reflected one parenting style (see Figure 6). The kits contained small chunks of raw data (i.e., quotes, photos, and audio fragments), our initial research findings, and five exercises. Yellow cards invited the designers to collect their observations and findings from working on the preparation kits.

AT was incorporated into the preparation kit in three ways: (1) by composing a set of raw data that covered all components of the activity systems; (2) by adding preliminary findings that hinted at patterns and contradictions within and between the activity systems (e.g., "Nadia and Friso have different opinions about baby care" or "Jolanda only puts baby Eric to bed when he's tired"); and

(3) by developing exercises that addressed concepts and components of the activity system. For example, in one exercise about mediation, the designers were asked to compare the things (or "artifacts") that used to help them fall asleep when they were young with the things that helped the baby fall asleep. Each of the five exercises in the kit addressed different concepts and components of AT.

The designers worked on the preparation kits individually for five days (phase D). A week later, the team members participated in a collective insights session aimed at developing shared understanding of baby care as a starting point for identifying opportunities for technology and concept development. During the session, the designers first discussed their observations and findings from working on the preparation kits. Then they created maps of parents' current situations by structuring their observations and findings on posters, and labeling groups of findings with themes. Finally, they used the maps in generating ideas about possible futures of baby care.

Findings from Using Activity Theory in the Baby Care Project
Trying out AT as a thinking tool of the social in the baby care project revealed four important findings. In this section, we discuss these findings and the implications for future projects.

Finding 1 – AT gave the designers, as well as the people researchers, a platform for structuring, discussing, and sharing the rich user experience data. In the analysis phase, using AT as a thinking tool in structuring and analyzing the user data did not lead to many new or different insights from the affinity diagramming approach. However, we in the people researcher role felt that the framework greatly enhanced the analysis process. We identified three advantages of using AT: First, the basic concepts of the framework provided fresh perspectives on how the data could be structured and interpreted. For example, the concept of activity hierarchy raised questions of where baby care and the actions involved in it begin and end. The concept of object-orientedness required considering the parents' long-term objectives of caring for their babies. And the idea of contradictions prompted us to discuss the essence of the dilemmas of baby care that parents face in everyday life. Second, the framework provided a structured approach to organizing the user data. Having structured the data using Engeström's model of an activity system facilitated identifying patterns and trends in the user data, and sharing the user data with the design team. And third, AT offered a structure for bringing in special effect theories, enabling us to specify findings and insights.

In the communication phase, the design team implicitly used AT as a thinking tool in reading and interpreting the user data. The first success was that nearly all the designers worked on the preparation kit. During the insights session, the components of the

activity system model were frequently used as anchor points in discussing and structuring observations and findings. Components were reflected in themes that were generated by the design team, such as "*Rituals help us to handle things we don't like*" (artifacts). And in discussing the themes, team members noticed, for instance, how parents' communities could play a central role in positioning their future product.

Finding 2 – It was difficult to implement and use AT in an integral way. We agree with Kaptelinin that the strength of AT is in its integration of concepts and components: When a design team uses only part of the framework (e.g., the components of AT) and simply ignores the rest, the team's chances of overlooking opportunities and constraints for design are likely to increase.[65] But implementing and using AT in an integrated way was difficult in the baby care project.

In the analysis phase, one concept was not used, and one principle was used differently. As people researchers, we did not use the concept of internalization and externalization. Internalization and externalization processes were touched upon in parents' stories about baby care, but detailed analyses of these processes were not needed at this stage for understanding the overall "what" and "why" of baby care, and thus were omitted to save time. We expect the concept of externalization and internalization to be more useful in later stages of NPD, when product or service concepts are developed.

The concept of historicity and development was used differently. Rather than conducting a longitudinal field study, which would not have been possible given the constraints of the project, changes of activity systems were traced through how people experienced them. However, the design team was able to learn about development of baby care in later phases of the project, when people studies were conducted that involved the same parents who had participated in the exploratory people study.

In the communication phase, only one of five concepts of AT surfaced in the designers' observations and findings—namely, the idea of contradictions within and between activity systems. One designer observed that a couple had different parenting styles (or rules): "*Gert is rational. He reads books about baby care. Jolanda is more intuitive, non-scientific*," he explained. And, looking at the division of labor, another designer noted, "*Laura has difficulties sharing tasks with Mark.*" The other four concepts, however, were not explicitly addressed in the designers' findings and discussions. Either the designers did not use these concepts in generating findings, or they used them implicitly.

In future projects, designers and people researchers could collaborate in a similar way as in the baby care project to ensure that the concepts and components of AT are integrally used in building creative understanding. However, the risk of this approach is that

65 Victor Kaptelinin, "Computer-mediated Activity: Functional Organs in Social and Developmental Contexts," *Context and Consciousness: Activity Theory and Human-computer Interaction*, ed. Bonnie A. Nardi (Cambridge: MIT Press, 1996), 45.

designers might start using only part of the framework (e.g., the components of the framework) in the belief that this one part *is* the framework. A more profound approach would be to introduce the components and the concepts of AT as inseparable parts of a whole. This means that AT needs to be translated as an integrated system for design, and not as a set of individual components and concepts, as done here. The challenge is to find such a translation of AT for design.

Finding 3 – The structure of the preparation kit did not support drawing "the big picture." In evaluating the insights session, the team applauded the overall process followed in sharing the user experience data. The team members were happily surprised by both the quality and number of themes they had generated, in comparison to their normal professional practice. They thought the themes were "*concrete*" in that the themes provided clear starting points for ideation. Most of the critical comments concerned the preparation kit. The team members explained that the components of the activity system had been useful in organizing the raw data in the kit, but that it had been difficult to "*get the full picture*" of the families and baby care because the components had been revealed over time. The "full picture" had emerged only in discussing and structuring observations and findings during the insights session. In future projects, the team members would prefer an overview of the families and baby care as an introduction to the preparation kit.

Finding 4 – Emotions are at the forefront of empathic design but are rather obscured in AT. A more general concern that as people researchers we noticed was the framework's lack of attention to the emotional domain. Empathic design stresses that rationality and emotions both need to be addressed in building creative understanding, but in AT, emotions are only implicitly addressed in the concept of object-orientedness.[66] When introducing AT as a thinking tool in future projects, the role of emotions in object-orientedness must be further explicated to ensure that they are sufficiently addressed in the analysis and communication of user data.

Conclusion

This paper reported our search for a theoretical framework that people researchers and designers could use as a thinking tool of the social in structuring and analyzing user experience data in empathic design practice. We examined a variety of frameworks on the basis of existing literature and then experimented with candidate frameworks in NPD practice.

We identified eight criteria for assessing the usefulness of frameworks for empathic design practice. Although the list of criteria is not exhaustive, it does help us to draw attention to aspects that researchers and designers need to consider when selecting a framework for analyzing user experience data.

66   Kaptelinin and Nardi, *Acting with Technology.*

The search process yielded five groups of frameworks: special effect theories, relational frameworks, catalogues, metaphors, and scaffolds of context. We found activity theory, as a scaffold of context, to be the best fit between design teams' needs and the frameworks' offerings. AT is different from many other frameworks we studied in that it transcends dichotomies between mind and world, and between individual and social. Moreover, AT provides "handles" of the social, as well as perspectives of the social, enabling designers and experienced people researchers to join forces in analyzing user experience data.

Testing AT as a thinking tool of the social in NPD practice, we found that it provides designers, as well as people researchers, with a platform for structuring, discussing, and sharing user experience data. The study also revealed two findings that pose important challenges for future research. First, AT addresses emotions merely implicitly, whereas emotions are at the forefront of empathic design. Thus, the role of emotions in AT needs to be further explicated when using AT as a thinking tool in future empathic design projects. And second, we translated AT for design in terms of a set of individual concepts and components, but the actual strength of AT is in its integration of concepts and components. In future projects, the framework needs to be translated as an integrated system so that designers can use the framework to its full potential.

A Process Framework of Affordances in Design
Udo Kannengiesser, John S. Gero

Introduction

One of the many goals of design research is to better understand the ways in which end users interact with the products of designing. This focus is not surprising—the ultimate measure of success for any design is the adoption by the user. The concept of affordance recently has been the focus of increased interest in the design research community because it captures well the relationship between human users and designed artifacts. It has been imported from cognitive science, where it was first introduced by the perceptual psychologist, James Gibson:[1]

> The *affordances* of the environment are what it *offers* the animal, what it *provides* or *furnishes,* either for good or ill. The verb *to afford* is found in the dictionary, but the noun *affordance* is not. I have made it up. I mean by it something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment.[2]

Affordances in design are the action possibilities of a user when the user interacts with an artifact. They can be "directly" perceived, based on the structural features of the artifact. This understanding has the advantage that users do not need to be provided with explicit instructions about how to use the artifact. As a result, they can spend less cognitive effort and make fewer errors when interacting with the artifact.

Affordances are dynamic in that they emerge from the interaction between the user and the artifact. Users interact differently with the same artifact at different times[3], which gives rise to different interpretations of affordances by these users. On the other hand, affordances tend to be generalized so that they are described no longer as specific to any individual user, but to groups of users or all users. This is apparent in the frequent use of word constructions ending with "-ability" when describing affordances. For example, the stairs in Figure 1 afford "climb-ability." Conceptualizing affordances as "-abilities" has the benefit that they can be thought of as general properties of artifacts that can be designed for or against. This conceptualization has established the basis for many affordance-based approaches to designing.[4]

1   J. J. Gibson, The Theory of Affordances, *in* R. E. Shaw and J. Bransford (eds) *Perceiving, Acting and Knowing,* (Hillsdale, NJ, Lawrence Erlbaum Associates, 1977), 67-82. J. J. Gibson, *The Ecological Approach to Visual Perception,* (Boston: Houghton Mifflin, 1979).

2   J. J. Gibson, *The Ecological Approach to Visual Perception* (1979), 127, emphasis is the author's.

3   D. Vyas, C. M. Chisalita, and G. C. van der Vee, Affordance in interaction, *Proceedings of the 13th European Conference on Cognitive Ergonomics: Trust and Control in Complex Socio-Technical Systems* (New York: ACM Press, 2006), 92-9.

4   D. A. Norman, *The Design of Everyday Things, Basic Books,* New York (2002). A. B. Galvao and K. Sato, Affordances in product architecture: Linking Technical Functions and Users' Tasks, *in Proceedings of ASME International Conference on Design Theory and Methodology* (Long Beach, CA, 2005), paper no. DETC2005-84525. J. R. A. Maier and G. M. Fadel, Affordance Based Design: A Relational Theory for Design, *Research in Engineering Design* 20:1 (2009), 13-27. J. R. A. Maier and G. M. Fadel, Affordance-based Design Methods for Innovative Design, Redesign and Reverse Engineering, *Research in Engineering Design* 20:4 (2009), 225-39.

Figure 1
Stairs affording "climb-ability"

Affordances can be viewed in two ways. One view describes affordances as *post-hoc* properties of a user-artifact system, and they are either known in advance or discovered by the user. Here, an affordance is assumed to pre-exist, regardless of whether the individual user is aware of that affordance. The alternative view emphasizes the situation of the user interacting with and reasoning about the artifact. In this view, affordances are defined with respect to the user's individual situation, rather than from the perspective of an omniscient observer. It allows new action possibilities to be generated as a response to changes in the user's experience or goals. This view closely matches Norman's notion of "perceived affordance,"[5] which we believe is more useful for design research than a *post-hoc* approach. However, to date there has been no clear articulation of perceived affordances or of the ways in which they can be produced.

This paper presents a process framework for perceived affordances to address this gap. (In the rest of this paper, we use the term "affordances" as shorthand for the notion of "perceived affordances.") It proposes three types of affordances that entail different assumptions regarding their dependence on the user's situation. All three types are then represented in the ontological situated function-behavior-structure framework,[6] revealing a rich set of processes involved in generating them. We argue that this view provides a better understanding of affordances that can be used for developing more methodological and tool support for designers.

An Ontological View of Affordances at a Macro Level

Modeling affordances is facilitated by using an ontological framework that provides a common terminology with agreed-on meanings for a domain of discourse. The function-behavior-structure (FBS) ontology provides such a framework for the design domain.[7]

Structure (S) of an artifact is defined as its components and their relationships (i.e., what the artifact consists of). The structure of artifacts includes their form (i.e., geometry and topology) and physical or virtual material.

Behavior (B) of an artifact is defined as the attributes that can be derived from its structure (i.e., what the artifact does). An example of behavior is the weight of an object, which can be derived (or measured) from the object's material and spatial dimensions, using knowledge about gravity and the material's density. Behavior provides operational, measurable performance criteria for comparing different artifacts. Deriving behavior may require knowledge about exogenous effects (i.e., the properties of those parts of the external environment that interact with the artifact). For example, deriving the rotational behavior of a door requires considering external, physical forces applied to that door. Exogenous effects can be caused by any entity in the artifact's environment, including human users.

5   D. A. Norman, *The Design of Everyday Things* (2002).

6   J. S. Gero and U. Kannengiesser: The Situated Function-behaviour-structure Framework, *Design Studies,* 25:4 (2004), 373-91.

7   J. S. Gero, Design Prototypes: A Knowledge Representation Schema for Design, *AI Magazine,* 11:4 (1990), 26-36. J. S. Gero and U. Kannengiesser, The Situated Function-behaviour-structure Framework, (2004).
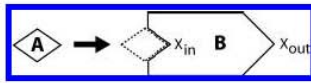
Figure 2

Behavior (B) as a construct that provides input parameters (X_{in}), representing relevant properties of affordances (A), and output parameters (X_{out}), representing the measurable states produced.

Function (F) of an artifact is defined as its teleology (i.e., what the artifact is for). It is ascribed to behavior by establishing a teleological connection between a human's goals and measurable effects of the artifact. Function is independent of the common distinction between "functional" and "non-functional" properties; it comprises both as they describe the artifact's usefulness for various stakeholders. Function is also independent of specific modeling approaches, including flow-based (dynamic) and state-based (static) models.[8]

In previous work, Brown and Blessing have argued that affordances appear to be similar to function but do not include the notion of teleology.[9] Affordances also appear similar to behavior; however, it is not the behavior of the artifact but of the agent that can be driven by affordances. So how do affordances relate to our understanding of designed artifacts?

Affordances are an agent's potential actions that interact with an artifact's structure and thereby produce artifact behaviors of relevance (i.e., with positive or negative consequences). These actions can be captured in the FBS ontology as exogenous effects on behavior. Figure 2 consists of two shapes that symbolize affordances and behavior, respectively. For an affordance to interact with behavior, there needs to be a "fit" between the two. This fit can be illustrated by conceptualizing behavior as including an "input port," or "receptor," that metaphorically mirrors the shape of the affordance. In other words, we can define input parameters of behavior that represent the properties of the affordances to which the output of that behavior is responsive.

This model of affordances as exogenous effects is consistent with Maier and Fadel's view of affordances as connecting structure and behavior.[10] However, affordances are not static catalysts for deriving behavior from structure in a reproducible, deterministic way. Human users engage with artifacts in a variety of ways as a result of their individual interpretation of the artifact's function, behavior, and structure; thus, they are unlike most computational tools that are preprogrammed to always derive the same class of behavior when given a specific class of structure. Our current macro-level view cannot show this dynamic model of affordances explicitly; we need to elaborate on this view to develop a more complete understanding of affordances.

Locating Affordances in a Framework of Reasoning

We can characterize affordances based on a framework for different general modes of reasoning of situated design agents that has been presented by Maher and Gero.[11] This framework provides a descriptive model rather than a cognitive model, and it has been

8 L. Chittaro and A. N. Kumar, Reasoning about Function and Its Applications to Engineering, *Artificial Intelligence in Engineering* 12:4 (1998), 331-6.

9 D. C. Brown and L. Blessing, The Relationship Between Function and Affordance, *in* ASME 2005 *Design Theory and Methodology Conference*, (Long Beach, CA, 2005), paper no. DETC2005-85017.

10 J. R. A. Maier and G. M. Fadel, Affordance Based Design: A Relational Theory for Design (2009).

11 M. L. Maher and J. S. Gero, Agent Models of 3D Virtual Worlds, *in* G. Proctor (ed.) *ACADIA 2002*, California State Polytechnic University, (Pomona, CA, 2002), 127-38.

used for elaborating various aspects of situatedness in design. The framework distinguishes between reflexive, reactive, and reflective modes of reasoning:

- *Reflexive reasoning* is a direct response of the agent to specific sets of stimuli to which it is exposed. Reasoning here does not entail any internal processing or decision making; it is merely a mapping of sensory input to actions performed by the agent's effectors. Examples include "hard-wired," biological reflexes and habituated responses to recurring stimuli. We can ascribe a high degree of confidence to reflexive reasoning that the resulting actions will produce the desired outcomes. This confidence is implicit in the actions rather than in an explicit, cognitive state of the agent.

- *Reactive reasoning* involves a limited form of interaction between various of the agent's internal representations. This interaction can be viewed as the process of selecting from several alternatives the most appropriate schema, given the stimuli presented. The need for decision making leads to a lower degree of confidence associated with the outcomes of the agent's actions. As a result, agents assess their decisions by monitoring the effects of their actions and comparing them against a set of criteria.

- *Reflective reasoning* involves a more significant amount of interaction between a model of the external world and the agent's goals and concepts. It is a construction process that uses filtering, emphasizing and distorting certain aspects of the external cues, driven by changes in the agent's expectations. The outcomes of actions devised by this mode of reasoning produce new expectations that provide new criteria for assessing these actions.

In computational experiments, Gero and Peng have shown that reflectively produced responses are grounded as new experiences that move toward being reactive as they are used in subsequent interactions,[12] and reactively produced responses similarly move toward being reflexive as they are successfully used in subsequent interactions.

Based on the three modes of reasoning, we can derive three classes of affordances: reflexive, reactive, and reflective ones.

Reflexive Affordances
The notion of affordance as originally proposed by Gibson is a "direct" form of perception that is often interpreted as involving a very limited amount of internal processing. This description is consistent with the reflexive mode of reasoning, and consequently

12   J. S. Gero and W. Peng, Understanding Behaviors of a Constructive Memory Agent: A Markov Chain Analysis, *Knowledge-Based Systems* 22:8 (2009), 610-21.
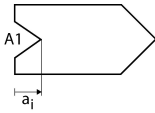
Figure 3
Reflexive affordance modeled within behavior as an input parameter A1 with a fixed (default) value a_i

we call these affordances reflexive. All stimuli provided by the artifact are directly mapped onto the user's actions. The fit between artifact and user is via the user's sensorimotor system. This fit is most evident for affordances of physical objects that mirror the shapes of the human body, such as shoes and gloves. The sensory data (here, the form of the artifact) directly fits with the user's effectors (here, the human's feet and hands). The affordance of "wear-ability" in these cases can be labeled "intuitive."[13]

Most affordances rely less on a strictly physical fit between artifact and user and instead involve more abstract classes of "fit" that require some internal representations (e.g., patterns and schemas) that match the external stimuli presented to the user. This type of connection is consistent with Norman's emphasis on the role of users' existing internal models in their perception of affordances.[14] For example, if a user has previously been exposed to a number of door handles with similar shapes, sizes, positions, and orientations, they will have constructed a schema that represents this class of artifact. When the user later comes across a particular door handle that matches this schema, the user can reflexively perform a set of actions associated with the schema, such as turning, pulling, pushing, or sliding the handle. The affordances of "turn-ability," "pull-ability," "push-ability," and "slide-ability,"[15] can be seen as outcomes of reflexive reasoning processes that are precursors of these actions. Their parameters have default values (i.e., all actions are executed uniformly). Using the idea of parameterized behavior introduced in Figure 2, Figure 3 shows, how a reflexive affordance can be modeled as an input parameter with a fixed value.

 Reactive Affordances

A reactive affordance is an action possibility that is selected from among a set of action possibilities. The process of selection is independent of changes in the user's current goals and expected classes of concepts. Variations over time are often the result of the user acquiring new knowledge from previous interactions.

Reactive affordances can be seen as the outcomes of a search process, analogous to the notion of search in routine or parametric designing. The basis for searching affordances is the availability of a range of instances of a class of action possibilities, and the ability to assess and then select different instances using a set of criteria. Instances of a class of action possibilities differ in the values these action possibilities assign to parameters of that class.

Searching affordances can be carried out internally using thought experiments, or externally using physical experiments. Every experiment consists of generating an action possibility and then testing it according to a set of criteria. If it is found to be unsatisfactory, the user can iteratively select and test different

13   A. Blackler, V. Popovic and D. Mahar, Towards a Design Methodology for Applying Intuitive Interaction, *in* K. Friedman, T. Love, E. Côrte-Real and C. Rust (eds) *Proceedings of WonderGround: 2006 Design Research Society International Conference*, (Lisbon, Portugal, 2006).

14   D. A. Norman, *The Design of Everyday Things* (2002).

15   A. Koutamanis, Buildings and Affordances, *in* J. S. Gero (ed.) *Design Computing and Cognition '06*, (Springer-Verlag, Dordrecht, 2006) 345-64.
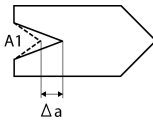
Figure 4
Reactive affordance modeled within behavior
as an input parameter A1 with a range of
values Δa.

action possibilities. For example, someone wanting to unlock a previously unknown door may turn the key the wrong way (say, clockwise). Upon recognizing the initial failure to unlock the door, the user selects an alternative action possibility (e.g., turning the key counter-clockwise), tests it, and finds that it successfully unlocks the door. The expectation that the key is to be turned has not changed during this process—only a parameter of this action (the direction of turning) has changed its values (from clockwise to counter-clockwise). Other examples of parametrically varying the same action possibility include turning the key with different forces, different speeds, and different fingers. Figure 4 shows how a reactive affordance can be modeled within behavior as an input parameter with varying values.

Reflective Affordances
Reflective affordances involve changes in the user's expectations generated by different situations. Situations are processes that influence what goals and concepts are constructed and how agents interpret and interact with their environment.[16] For example, users of office doors are likely to respect the privacy of the people behind these doors; as a result, the new affordance of "knock-ability" may be formed, making the users knock on the door before entering. Other situations (e.g., the imminent threat of an armed hold-up) may produce the new goal of blocking a door rather than walking through it and the new affordance of "jam-ability" (e.g., by jamming a chair underneath the door handle). Thus, different situations lead to different user expectations that can then produce different affordances. "Hidden affordances" (i.e., ones for which obvious perceptual cues are not provided by the artifact)[17] can be viewed as instances of reflective affordances.

The notion of exploration in non-routine or conceptual designing can be applied to describe how users "discover" new affordances via reflective reasoning. Exploration creates new expectations related to classes of action possibilities and their criteria for assessment. It is non-routine because the user can no longer rely solely on an existing set of expectations. Exploration can be modeled as modifying the state space of action possibilities.

Exploration can be carried out internally using thought experiments, or externally using physical experiments. The latter has been studied in developmental psychology and has been found to involve "exploratory activities."[18] For example, infants explore their environment through seeing, reaching, grasping, and tasting, among other actions. Discovering new door-opening mechanisms (e.g., button-operated automatic doors) requires a more fine-tuned but still exploratory set of actions. The exploratory nature of reflective affordances can enable a user to recognize "false affordances"[19] or "misinformation"[20] provided by the artifact.

16   J. S. Gero and G. J. Smith, Context, Situations, and Design Agents, *Knowledge-Based* Systems 22:8 (2009), 600-9.

17   W. W. Gaver, Technology Affordances, *in* S. P. Robertson, G. M. Olson and J. S. Olson (eds) *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Reaching through Technology*, (New Orleans, LA,1991), 79-84.

18   E. J. Gibson, Exploratory Behavior in the Development of Perceiving, Acting, and the Acquiring of Knowledge, *Annual Review of Psychology* 39 (1991), 1-42.

19   W. W. Gaver, Technology Affordances, (1991).

20   J. J. Gibson, *The Ecological Approach to Visual Perception*, (Houghton Mifflin, Boston, 1979).

21 J. S. Gero and U. Kannengiesser, The Situated Function-behaviour-structure Framework (2004).

22 J. S. Gero and U. Kannengiesser, The Situated Function-behaviour-structure Framework (2004).

23 J. Dewey, reprinted in 1981, The Reflex Arc Concept in Psychology, *Psychological Review* 3 (1896), 357-70. F. C. Bartlett, reprinted in 1977, *Remembering: A Study in Experimental and Social Psychology,* (Cambridge University Press, Cambridge, 1932). I. Rosenfield, *The Invention of Memory*, (Basic Books, New York, 1988), W. J. Clancey, *Situated Cognition: On Human Knowledge and Computer Representations*, (Cambridge University Press, Cambridge, 1997).

Figure 5 shows how a reflective affordance can be modeled within behavior as a new type of input parameter.

An Ontological View of Affordances at a Micro Level
We can develop an ontological framework of affordances that goes beyond the narrow view of affordances as catalysts for deriving fixed and known behaviors. This view captures reflexive affordances but not reactive or reflective ones. However, the situated FBS framework developed by Gero and Kannengiesser can be used to capture all three classes of affordances.[21]

The Situated FBS Framework
This section provides a brief description of the situated FBS framework; for more information, see Gero and Kannengiesser.[22]

Figure 6 introduces two "worlds:" an *interpreted world* that represents current ("as-is"), past ("as-was"), and hypothetical ("as-could-be") states of the world, and an *expected world* that represents desired ("to-be") states of the world for the current design interaction. The different states of the world(s) are described using the concepts of function, behavior, and structure of the design representations. In the interpreted world, behavior (B^i) is derived from a given or hypothetical structure (S^i), and function (F^i) is derived from a given or hypothetical behavior (B^i). In the expected world, expectations are produced about what behaviors (Be^i) are needed to achieve desired functions (Fe^i), and what structures (Se^i) are needed to exhibit desired behaviors (Be^i). The expected world is a subset of the interpreted world, as indicated by their nesting in Figure 6. Accordingly, Fe^i, Be^i, and Se^i are defined as subsets of F^i, B^i, and S^i, respectively.

In addition to the transformations between function, behavior, and structure within the two worlds, Figure 6 shows a number of additional processes:

- *Focusing* selects subsets of F^i, B^i, and S^i to be used as Fe^i, Be^i, and Se^i. Once selected, a subset is not fixed but can be changed by focusing on different F^i, B^i, or S^i.
- *Comparison* determines whether an "as-is" state of the world is consistent with a "to-be" state of the world. This process compares Be^i and B^i, as it is the behavior level that provides measurable attributes for evaluating different artifacts.
- *Constructive memory* can produce new F^i, B^i, and S^i. This process represents a richer notion of memory than simple recall via indexing. It includes the role of subjective, individual experience in constructing new concepts that are tailored to the agent's current situation.[23] Constructive memory can be modeled using the idea of intertwined

data-push and expectation-pull,[24] which is denoted in Figure 6 using a combined straight-and-returning arrow symbol.

Figure 7 is an extension of Figure 6. It adds the *external world,* which consists of things outside the agent, including the functions, behaviors, and structures (F^e, B^e, and S^e) of artifacts that the agent can interact with.[25] The external world also includes requirements on the functions, behaviors, and structures (FR^e, BR^e, and SR^e) of artifacts. The process numbers in Figure 7 are labels only and do not represent an order of execution.

Adding the external world introduces the processes that connect it with the expected world and the interpreted world:

- *Action* produces F^e, B^e, and S^e according to Fe^i, Be^i, and Se^i. Action producing B^e is the execution of expected design actions.
- *Interpretation* uses F^e, B^e, and S^e to produce F^i, B^i, and S^i using the same "push-pull" idea as for constructive memory: The results of interpretation are not simply "pushed" by what exists in the external world; instead, they emerge from the interaction of "push" and "pull." Thus, the same F^e, B^e, and S^e can be interpreted differently at different times, leading to changes in the F^i, B^i, and S^i generated.

Locating Affordances in the Situated FBS Framework

The situated FBS framework is general enough to capture the activities of a user interacting with an artifact because the notions of interpreted and expected worlds are independent of any specific agent and can relate to the designer, the user, or any other stakeholder. However, describing users' interactions with the artifact requires two specializing assumptions:

1. External structure and external behavior are embodied in the target environment of the design—not in a representation of that target environment. For example, the target environment of a door is the physical environment; possible representation environments include CAD systems, paper, and human minds.
2. Actions to create or change external behavior (process 17 in Figure 7) consist of those that produce exogenous effects that are also embodied in the target environment. Thus a user's actions are distinguished from those of a designer, in that the latter are primarily concerned with changing representations of behavior rather than with the behavior itself. Affordances are the input parameters of behavior, as we explained earlier.

= transformation / action
= comparison
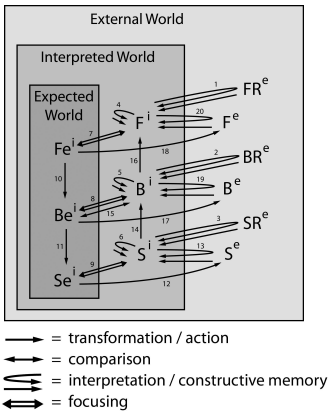= interpretation / constructive memory
= focusing

Figure 7

The situated FBS framework that includes function, behavior, and structure in the external world (F^e: external function, B^e: external behavior, S^e: external structure, FR^e: external requirements on function, BR^e: external requirements on behavior, SR^e: external requirements on structure).

24   J. S. Gero and H. Fujii, A Computational Framework for Concept Formation for a Situated Design Agent, *Knowledge-Based Systems* 13(6), (2000), 361-8.
25   J. S. Gero and U. Kannengiesser, The Situated Function-behaviour-structure Framework (2004).

Affordances transform external structure into external behavior. This transformation involves at least the following sub-processes in Figure 7:

- Process 13: transforms S^e into S^i
- Process 14: transforms S^i into B^i
- Process 15: evaluates B^i against Be^i
- Process 17: transforms Be^i into B^e

These sub-processes compose what we call the *affordance production process*. Additional sub-processes for pre- and post- processing are required, depending on whether the affordances are reflexive, reactive, or reflective. The differences are summarized in Table 1 and discussed in more detail in the remainder of this section.

Reflexive Affordances

The processes involved in producing reflexive affordances are highlighted in Figure 8.

There is no pre-processing for reflexive affordances. Be^i and Fe^i are pre-formulated and readily provide a pattern to be matched by the interpretation of the artifact based on its S^e. All input parameters of Be^i have fixed values. For example, S^e may be a door with specific features, Fe^i may be "to allow access to a room," and Be^i may be a rotating behavior with fixed values for the direction (say e.g., "outward") and the amount of force one needs to apply to the (handle of the) door. Another example is a flight of stairs, as in Figure 1. Here, S^e consists of the shape of the stairs, Fe^i may be "to allow descent in a controlled way," and Be^i may be a "walking support" behavior with fixed values for the input parameters "stepping rhythm" and "speed."

The affordance production process establishes a match between the expectations and interpretations of the door and stairs, and then executes the affordance. No post-process monitoring or
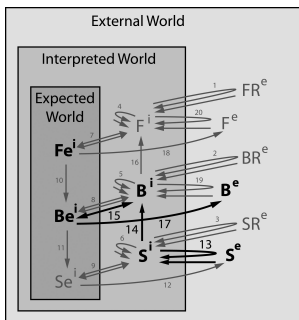
Figure 8

Concepts and processes (highlighted) in reflexive affordances.

Table 1

Reflexive, reactive, and reflective affordances have the same production process but differ in their pre- and post-processing. Numbers refer to the processes defined in Figure 7.

Type	Pre-Processing	Affordance Production Process	Post-Processing
Reflexive	No pre-processing required	• Input: S^e • Transformation: 13, 14, 15, 17 • Output: B^e	No post-processing required
Reactive	Any of: • Selecting Be^i: 8 • Selecting Fe^i: 7		• Assessing the affordance: 19, 15 • Optionally, re-selecting Be^i and/or Fe^i by new pre-processing
Reflective	Any of: • Constructing Be^i: 5, 8, 10 • Constructing Fe^i: 4, 7, 16		• Assessing the affordance: 19, 15 • Optionally, re-constructing Be^i and/or Fe^i by new pre-processing

analysis of the external behavior is needed because the validation of the affordance is assumed by default. In the door example, a person pushes against the door to produce an external behavior using the expected values of direction and amount of force. In the stairs example, a person walks down the stairs to produce a walking support behavior with the expected values for stepping rhythm and speed. No post-process monitoring or analysis of the external behavior is needed, as the validation of the affordance is assumed by default.

Reactive Affordances

The processes involved in producing reactive affordances are highlighted in Figure 9.

Pre-processing for reactive affordances includes selecting from among alternatives to formulate Fe^i (process 7 in Figure 9) or Be^i (process 8). Alternative Fe^i for doors may include "to allow access to a room" and "to allow exit from a room." A choice between the two Fe^i can influence the selection of alternative Be^i input parameters such as pushing (i.e., "outward" direction) or pulling (i.e., "inward" direction) a specific door. Here, let us assume that the value "outward" is selected for the "direction" parameter of Be^i, based on choosing "to allow exit from a room" as Fe^i. In the stairs example, the person may have the choice between the two specialized Fe^i "to allow fast descent to catch the train" and "to allow descent without spilling your cup of coffee." This has an impact on the selection of a value for "speed" in the stairs' Be^i. Let us assume that a low value is selected to avoid spilling coffee.

Post-processing includes the interpretation of B^e resulting in a new B^i (process 19), and evaluation of that B^i against Be^i (process 15). These processes are necessary to test whether the selected affordance is appropriate. If the affordance "succeeds," no further processes are needed in the scope of that affordance. For example, pushing against the door might produce the expected rotating behavior, which is perceived and evaluated as satisfactory. Walking down the stairs with reduced speed may successfully avoid spilling any coffee.

If the affordance "fails" the test, three possible consequences result. One consequence might be the selection of previously unselected values of input parameters of Be^i, leading to the repeated generation of variants of the same type of affordance (process 8). For example, if pushing against the door is unsuccessful, the person might choose to pull instead of push (i.e., changing the value of the "direction" parameter to "inward") and then to execute and test this new variant of the affordance. This scenario can be viewed as an instance of a discrete control system. In the stairs example, if the person spills coffee while walking down the stairs, the value for the "speed" parameter may be further reduced, and the consequences of this change are then monitored and assessed. This scenario can be viewed as an instance of a continuous control system.
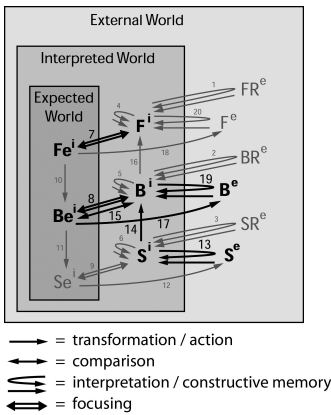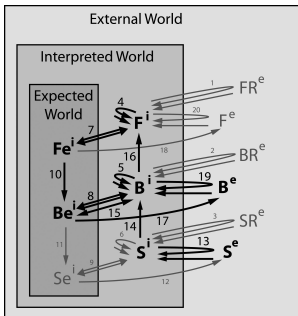

= transformation / action
= comparison
= interpretation / constructive memory
= focusing

Figure 9

Concepts and processes (highlighted) in reactive affordances.

External World

Interpreted World

Expected World

FR^e

F^e

F^i

Fe^i

BR^e

B^i

B^e

Be^i

SR^e

S^i

S^e

Se^i

→ = transformation / action
↔ = comparison
⇉ = interpretation / constructive memory
⇔ = focusing

Figure 10
Concepts and processes (highlighted) in reflective affordances.

Another consequence of a "failed" affordance may be the reformulation of input parameter values of Be^i by including new yet previously known alternatives (process 8). This change can expand the space of possible affordances. For example, if both possible directions of the force on the door fail, the person might increase the expected amount of force so that it exceeds the initial range. In the stairs example, the person might choose to change the stepping rhythm, thus relaxing a previously fixed input value of the stairs' behavior.

A third consequence may be to modify the selection of Fe^i (process 7) when re-selecting Be^i is not successful. Most commonly, this results in the original Fe^i being dropped. For example, the functions "to allow exit from a room" and "to allow descent without spilling your cup of coffee" may be dropped when the door cannot be opened and the stairs cannot be descended without spilling coffee, respectively.

The class of reactive affordances subsumes the class of reflexive ones. It augments the latter by providing the potential to repeatedly select affordances and to reformulate the ranges of parameter values of expected behaviors.

Reflective Affordances
The processes involved in producing reflective affordances are highlighted in Figure 10.

Pre-processing for reflective affordances includes more processes than for reactive and reflexive ones because Fe^i and/or Be^i are not pre-formulated and cannot be selected from existing alternatives. These processes generate expectations depending on the current situation, leading to new or unfamiliar Fe^i and Be^i. In the door example, the person's changing expectations from the "rotating" behavior to a new "sliding" behavior results from a process of reflecting on behavior (process 5 in Figure 10) and then focusing on that behavior (process 8). Introducing a function of "preventing other people from accessing a room" is a consequence of reflecting on function (process 4) and focusing on that function (process 7). Based on this new Fe^i, the person might then derive the expectation of a "locking" behavior (process 10) that affords a specific rotating motion of a key. In the stairs example, the person might similarly generate the new function, "to allow resting," by reflecting and focusing. A new "seating support" behavior can then be derived from this new function. The input parameters of a reflectively produced Be^i might include specific, fixed values (e.g., "leftward" direction of a force for sliding the door), and/or ranges of values (e.g., variable amounts of force).

Post-processing includes at least the processes of interpreting (process 19) and then evaluating (process 15) an affordance via the associated artifact behavior. In addition, there is the potential for

reconstructing expectations by formulating new Be^i and Fe^i, and hence constructing new types of affordances. A frequent precursor of reformulation is the discovery that an observed (i.e., interpreted) behavior can be useful because a new, interpreted function (F^i) can be derived from it (process 16). An example of such a serendipitous discovery is when a sliding door is pushed too far to the side and slips from the end of its sliding rail. This behavior might be interpreted as useful when the door needs to be removed for replacement or repair. Recognizing the utility of this behavior can be represented as deriving the function "to allow easy removal," which may or may not have been intended by the door's designer. Sitting on stairs can similarly lead to the interpretation of a new behavior. For example, assuming that the stairs may have warmed up in the sunlight, their raised temperature can be sensed by sitting on them. This corresponds to a new behavior, which could not have been discovered simply by walking on the stairs (in footwear). A new function, "to allow warming of the human body," may be derived from this behavior.

The class of reflective affordances subsumes the class of reactive ones. It augments the latter by providing the potential for reformulating expected functions and for reformulating expected classes of behaviours. Reflective affordances can shift the space of possible affordances into previously unexpected or unknown regions. Reformulations can occur at any time, potentially moving affordances from being reflexive or reactive to reflective.

Conclusion

Affordances, the short-hand term used to mean "perceived affordances" in this paper, are not fixed properties but the results of dynamic processes that constitute a user's interactions with an artifact. This paper has presented three types of affordances that vary in their ability to deal with the dynamics of these interactions. Reflexive affordances assume a static world that provides a close but rigid fit between action possibilities and artifacts. Reactive affordances allow for variation in the selection of action possibilities, integrating feedback provided by the resulting artifact behavior. Reflective affordances can generate new worlds of action possibilities through reflection and through exploratory discovery of possible behaviors. The three types of affordances are related through subsumption: Reflective affordances subsume reactive ones, and reactive affordances subsume reflexive ones. Reflective affordances, through their use, tend to become reactive and then reflexive, but there is always the potential for affordances to move the opposite way, too, as a user's situation changes. Thus, the range of use for a design can expand beyond what was intended by the designer.

Our framework is a synthesis of conceptual ideas related to situatedness in designing. While some of these ideas are based on cognitive studies of designing, more work needs to be done toward

validating our framework. Representing and experimentally consolidating the three types of affordances can enhance understanding of affordances, which facilitates progress in two broad areas of research.

One area is research into new methods and tools for affordance-based design. For example, existing affordance-based design methods may be extended to include better support for the adoption of creative designs. Creative designs, by definition, provide novel functionalities and often provide novel ways for users and artifacts to interact. "Preparing" the user to easily identify appropriate affordances for a new interaction is crucial for the adoption of a creative design. Our framework presents a set of pre-processing steps that can be targeted when designing, realizing, or marketing creative artifacts.

Another possible research direction is the development of models of user-driven innovation that may be used to stimulate design creativity. These models may be implemented as agent-based systems that simulate possible user interactions and thus generate opportunities for discovering new functionalities and features of a design. A necessary condition for such simulations is the integration of the user's situations before and after an affordance is produced because they allow for recursive interactions that are often the precursor for user innovation. Our description of pre- and post-processing steps can be used as a blueprint for building such a system.

Another area of research that can benefit from our work is the development of affordance-based agent interaction. For example, research in robotics has already started using the idea of affordances in robot control systems, focusing on robot navigation and task execution.[26] Currently, most of these approaches are based on pre-coded affordances. Using our framework, they map onto reflexive or reactive affordances but not onto reflective ones. Although robots have been built that can explore new affordances of tools by trying out and then grounding possible actions,[27] these exploratory activities are not driven by changes in the robots' goals and expectations. As a result, the adaptability of the robots in new, unstructured environments is very limited. Current affordance-based architectures for agents in virtual environments are subject to similar limitations. We can identify reflective affordances as a precondition that can lead to more effective deployment of agents in dynamic environments.

Acknowledgements

26   E. Rome, J. Hertzberg and G. Dorffner (eds), *Towards Affordance-Based Robot Control*, LNAI 4760, (Springer-Verlag, Berlin, 2008).

27   A. Stoytchev, Learning the Affordances of Tools Using a Behavior-Grounded Approach, *in* E. Rome, et al. (eds) *Towards Affordance-Based Robot Control*, LNAI 4760, (Springer-Verlag, Berlin, 2008), 140-58.

Trashion: The Return of the Disposed
Bahar Emgin

That objects lead "social lives" of their own as they move through their biographies and undergo successive shifts in their commodity status has already been acknowledged.[1] Igor Kopytoff, a professor of anthropology, introduced the notion of commoditization "as a process of becoming rather than as an all-or-none state of being."[2] The idea that objects do not enjoy an unending commodity status but that their lives are marked by the ebb and flow between a commodity and non-commodity was central to Kopytoff's argument. As such, Kopytoff wrote, the biography of an object was considerably similar to that of a person: occupying different positions, leading diverse careers in the course of different periods between a beginning and an end, being defined by different regimes of value that are both economically and culturally inscribed.[3]

In light of this argument, one could claim that the end of the life of an object corresponds to the moment in which it is disposed of. This disposal might take place in different forms and for different reasons; however, in the most literal and common sense, the life of an object ends in a trashcan in the form of waste. In this moment, the object is left valueless in all the possible meanings of the term value: It can no more serve a function, it can on no account be exchanged for anything else, and it can by no means engage in the processes of signification to connote and endow its user with specific social values.

This article is about those objects that are recreated from trash through the process of upcycling. Upcycling is a term used by architect and designer William McDonaugh and chemist Michael Braungart and refers to "the process of converting an industrial nutrient (material) into something of similar or greater value, in its second life."[4] I argue that design, in this instance, acts as a tool of transformation and reintroduces into certain orders what was once deemed waste. This theory counters the argument that an object is dead once it is disposed of.

Such a conceptualization of waste as "the degree zero of value" has been contested for some time in different disciplines, ranging from economics to environmental studies, but most particularly by those studying consumerism or material culture.[5] To give an example, recycling has been endowed with a wide variety of economic, environmental, and moralistic claims. Gay Hawkins

1   The idea that objects lead social lives was elaborated and discussed in detail in Arjun Appadurai (ed.). *The Social Life of Things: Commodities in Cultural Perspective,* (Cambridge, UK: Cambridge University Press, 2003).

2   Igor Kopytoff, "The Cultural Biography of Things: Commoditization as Process," in *The Social Life of Things: Commodities in Cultural Perspective,* ed. Arjun Appadurai (Cambridge, UK: Cambridge University Press, 2003), 73.

3   Kopytoff, "The Cultural Biography of Things," 66.

4   "Upcycle," The Dictionary of Sustainable Management, http://www.sustainability-dictionary.com/u/upcycle.php, (accessed January 6, 2010.)

5   Gay Hawkins and Stephen Muecke, "Introduction: Cultural Economies of Waste," in *Culture and Waste: The Creation and Destruction of Value*, ed. Gay Hawkins and Stephen Muecke (Oxford: Rowman & Littlefield Publishers, 2003), ix.

elaborates on the changing meanings of waste disposal and the evolving attributions of recycling in her article titled "Plastic Bags: Living with Rubbish." Referring to the work of Susan Strasser, Hawkins argues that disposal was central to the logic of mass production and hence should not be assessed as only particular to consumerism in the twentieth century: "Mass production of objects and their consumption depends on widespread acceptance of, even pleasure in, exchangeability; replacing the old, the broken, the out of fashion with the new. The capacity for serial replacement is also the capacity to throw away without concern."[6] What Strasser underlines in *Waste and Want*, and what Hawkins agrees with in her article, is the idea that "the ethos of disposability" was fostered by the "desire for possession or convenience" as early as the 1860s, leaving behind all concerns for the afterlife of the trash.[7] According to this idea, the emergence of a consumer society in the 1950s only made the joy of disposing, which was once a privilege of the upper classes, accessible to the masses. Within the regimes of value of mass production, disposal was coded as an act directed toward renewal, restoration, and purification; thus, the process of disposing was not yet loaded with moral or ethical connotations.[8]

On the contrary, with respect to the issue of disposability, waste was handled merely "as a technical problem, something to be administered by the most efficient and rational technologies of removal."[9] Only through the rise of environmental movements in the 1960s did the disposal of waste come to be loaded with negative meanings and viewed through a moral framework. The enormous quantities of waste accumulating in urban centers, Hawkins writes in "Plastic Bags," were not only taken as a threat to the environment, but also as a sign of an individualistic, insensitive, and hedonistic consumer society.[10] Waste now became evil. If the environment is to be saved from our destructive power, then waste should be "managed," Hawkins asserts.[11] Consequently, recycling gained its contemporary prominence "as *virtue*-added disposal . . . disposal in which the self is morally purified, disposal as an act of redemption."[12] Disposal in the form of recycling is now a moralistic attitude through which we pay the debt we owe to the world.

The new, growing trend of trashion can be assessed within this framework of recycling. Trashion is defined in Wikipedia as "a term for art, jewelry, fashion, and objects for the home created from used, thrown-out, found, and repurposed elements. The term was first coined in New Zealand in 2004 and gained in usage through 2005."[13] The term is made from the combinations of the words "trash" and "fashion," and its creation can be counted as an example of upcycling. In short, "trashion is a philosophy and an ethic encompassing environmentalism and innovation. Making traditional objects out of recycled materials can be trashion, as can making avant-garde fashion from cast-offs or junk. It springs

6   Gay Hawkins, "Plastic Bags: Living with Rubbish," *International Journal of Cultural Studies* 4:1 (2001): 9. For the history of rubbish, see Susan Strasser, *Waste and Want: A Social History of Trash* (New York: Metropolitan Books, Henry Holt and Company, 1999).

7   Hawkins, "Plastic Bags," 9.

8   Ibid., 10.

9   Ibid.

10 Ibid.

11 Ibid., 11.

12 Ibid., 14.

13 "Trashion," http://en.wikipedia.org/wiki/Trashion (accessed January 6, 2010).

from a desire to make the best use of limited resources."[14] The most outstanding examples of trashion can widely be found among the booming fields of green or eco-friendly design or the do-it-yourself (DIY) movement. Trashion emerges first and foremost as a claim to fulfill the aforementioned moral and ethical responsibility, in the same way that recycling or waste management are promoted as a means of "assuaging our guilt about the planet, being virtuous for the neighbors and engaging in a form of disciplinary individualism that is both voluntary and coercive at the same time," according to Hawkins.[15] By means of upcycling or trashion, waste can experience a rebirth and therefore a second chance of being used and reintegrated into exchange or identification processes. Thus, not only is the environment purified by upcycling, but people involved in trashion, as both designers and users, are also ennobled by virtue of their commitment to nature and humanity.

However, to consider either recycling or upcycling merely as moral issues would be misleading. On the other side of the coin is the business stemming from these practices; recyclers not only ease their conscience through recycling; they also make a profit. Recycling, as "the huge tertiary sector devoted to getting rid of things, is central to the maintenance of capitalism; it doesn't just allow economies to function by removing excess and waste—it *is* an economy, realizing commercial value in what's discarded," Hawkins and Muecke write in *Culture and Waste*.[16] In the same manner, upcycling has already been turned into a business: Certain designers labeled eco-friendly are earning money through upcycling, competitions are organized around trashion, numerous websites are devoted to promoting and selling upcycled objects, and online and print resources explain how to upcycle at home. In short, there is a whole sector of upcycling now.

Only mentioning the moral and economic aspects of upcycling and arriving at a conclusion regarding the consequences of it for consumer culture would be cutting corners. There is still more complexity to the issue than appreciating upcycling for its ethical stance or blaming it for being only another means of commoditizing. What is left untouched in this account, Hawkins and Muecke point out, and what is more promising for an analysis of trashion, is the "cultural economy of waste" that "can work on different strata: symbolic, affective, historical and linguistic."[17] First, as Hawkins and Muecke point out, this approach requires an emphasis on the "hierarchical, ordered, and systematic determinations of value."[18] In addition, a new conception of waste, which does not handle rubbish as valueless and evil, is required. Only from this perspective can we acknowledge waste as an active agent in the regimes of value. For this reason, I introduce in the following section the changing conceptions of waste that are central to my analysis of trashion.

14 Ibid.
15 Hawkins, "Plastic Bags," 12.
16 Hawkins and Muecke, "Introduction," x.
17 Ibid. xvi.
18 Ibid.

1. Re-considering Waste

Contributions to the reconsideration of the notion of waste have, to a great extent, come from the field of anthropology. Ethnographic studies on gift and potlatch, burial rites and sacrifice, as well as studies of consumption itself, influenced certain scholars and gave rise to the questioning of old notions of waste and disposal. Kevin Hetherington is one scholar who has considered the subject in light of the studies on disposal by Mary Douglas, Roland Munro, and Michael Thompson. Hetherington begins his analysis with a refusal to see the concept of disposal as "the last act that leads inexorably to a closure of a particular sequence of production-consumption events."[19] Disposal for him lies at the heart of consumption and is as central as the accumulation of objects to "managing social relations and their representation around themes of movement, transformation, incompleteness, and return."[20] In this respect, Hetherington writes that a spatial dimension is added to the issue of disposal, and it becomes a matter of "placing" rather than discarding:

> [D]isposal is a continual practice of engaging with making and holding things in a state of absence, [with] any notion of return (beyond simple equations of return with green recycling), or [with] any notion of understanding how something can be in a state of abeyance or "at your disposal" and what the effects of that might be.[21]

Once the linear passage from production to consumption and lastly to disposal is broken, the role of disposal in the processes of both individual and social ordering becomes apparent. Disposal is not an end to these processes in succession, but a matter of putting things in a state of absence, invisibility, or remoteness—either metaphorically or literally—through a process of valuation, and in this manner, disposal—keeping certain things as "matter out of place"—functions to stabilize the processes of ordering, Hetherington writes.[22] However, the discussion at this level is quite structuralist, according to Hetherington, and is directed toward maintaining a definite and stable social order. The significance of disposal for consumption can only be assessed if disposal is viewed "as a recursive process."[23] That is, disposal is never complete; objects can never be disposed of 100 percent, but they fluctuate between a state of absence and a state of presence. The disposed always carries with it the possibility of coming back: "Its capacity for translation remains as an absence just as much as when a presence is encountered."[24]

In *Culture and Waste: The Creation and Destruction of Value*, John Frow deals with the issue of waste by opposing the theories that handle it as "the degree zero of value" or "the opposite of value" or "whatever stands in excess of value systems grounded in use."[25] He refers to the role of waste in constructing value in this way: "On

19 Kevin Hetherington, "Secondhandedness: Consumption, Disposal, and Absent Presence," *Environment and Planning D: Society and Space* 22 (2004): 159.

20 Hetherington, "Secondhandedness," 157.

21 Ibid., 159.

22 Ibid.

23 Ibid.

24 Hetherington, "Secondhandedness," 162.

25 John Frow, "Invidious Distinction: Waste, Difference, and Classy Stuff," in *Culture and Waste: The Creation and Destruction of Value*, ed. Gay Hawkins and Stephen Muecke (Oxford: Rowman & Littlefield Publishers, 2003), 25.

the one hand it is residually a commodity . . . On the other hand, the category of waste underpins any system of social distinction, as the principle of uselessness that establishes a non-utilitarian symbolic order."[26] Similar to that of Hetherington, the symbolic order or the systems of value that Frow defines are far from being definite, closed, and static structures. On the contrary, value is always referred to as a "process, a movement, a cycle" being defined, contested, and redefined over and over again.[27] Within such a value system, waste or rubbish retains its chance of return and is even bestowed with the chance to define a completely new regime of value, disturbing the orderings and classifications that are based on the preceding one.

For both Hetherington and Frow, waste—or the valueless—can always reach a totally adverse state of high value, and even over-value, and they both elucidate this possibility through references to Michael Thompson's *Rubbish Theory*. As Hetherington explains, Thompson in his study defines three different classes of objects: durable, transient, and rubbish. Durable objects are marked by their high status and hence they are, in a manner of speaking, dignified; transient objects cannot enjoy a life-long high status, and their value decreases gradually over time; and rubbish, as the last category, can by no means be valued: "They become blanks that can address not only the question of value in the singular instance but also value as a general category."[28] The status of objects in the categories of both durable and transient is clearly defined; the codes that assign these objects to their categories are fixed; and their value is under the control of social agents who strive to maintain the existing ordering.[29] However, the case for rubbish objects is different; they are free from the control exerted on the other two categories. Hetherington writes that they stand on "a blank and fluid space between the other two categories, helping to maintain their separateness while also providing a conduit for objects to move back and forth into the regions of fixed assumptions."[30] Hetherington criticizes Thompson's classification for its stress merely on exchange, which he says overlooks other possible ways of valorizing an object (e.g., a sentimental valorization). Nevertheless, for both Hetherington and Frow, the value of Thompson's classification lies in the manner in which it opens up a dynamic space that allows a transition between categories and thus transformations in status, which in turn introduces fluidity to value systems. In light of Thompson's classification, it becomes possible to conceptualize rubbish as the "conduit of disposal rather than that which is placed in the conduit."[31]

At this point, Hetherington introduces a new metaphor and places the door, rather than the dustbin, as the proper exemplar of the conduit of disposal. "Not only do doors allow traffic in both directions when open, but they can also be closed to keep things

26   Frow, "Invidious Distinction,"26.

27   Ibid., 35.

28   Hetherington, "Secondhandedness," 164.

29   Ibid.

30   Ibid., 165.

31   Hetherington, "Secondhandedness," 164.

outside/inside, present/absent, at least temporarily and provisionally."[32] Thus, not only is the process of disposal flexible, but the conduits of disposal are themselves fluid, undermining through the process of transfer any possibility of stability in the regimes of value used.

The passage of the objects through these conduits can end either in de-commoditization, namely in prolonging the priceless state of being—not at the level of zero value this time, but at the level of such a high value that there can be no equivalent for it in any exchange system or in commoditization. Commoditization, here, would rather be referred to as re-commoditization since the object in question had once been a commodity before it moved through the conduit of disposal. Collection constitutes an example of the former, while trashion provides an example of the latter. Hetherington also refers to collection as a conduit of disposal:

> Still, much collecting derives its meaning precisely from this dynamic—the making of the reputation of an object (and thereby its status and value) by making it visible, recognisable, and "respectable" (including cult or subcultural respectability with respect to kitsch). A cheap, contemporary, utilitarian object can be disposed of by one generation only to return later and be claimed as a design classic by the next.[33]

Valorization through the conduit of collection is not performed at the level of exchange value because the object of collection does not gain an extensive exchangeability; on the contrary, its exchangeability for anything else is substantially restricted. Through this process, the act of "singularization" can be pointed to as the creator that counteracted the object's commoditization. Singularization, as defined and elucidated by Kopytoff, is a process by which things are deprived of their commodity status through a withdrawal from the sphere of exchange.[34] The struggle between singularization and commoditization begins at the very moment that the actual exchange is accomplished— when the thing is stripped of its unquestionable commodity status.[35] From this moment on, the thing is vulnerable to several processes of individual or collective singularizations, which in turn deactivate it as a commodity and cause shifts in its biography.

For the waste, which has been left valueless, singularization would not come to mean decommoditization but would mean that the object is prevented from being commoditized; valorization occurs in the form of sacralization.[36] In this manner, the object is given value at the level of symbolic exchange, as explicated by Jean Baudrillard in *For a Critique of the Political Economy of Sign*; these objects of collection come to be valued—not within the exchange system itself but

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32 Ibid.
33 Ibid., 165.
34 Kopytoff, "The Social Life of Things," 74.
35 Ibid., 83.
36 Kopytoff, "The Social Life of Things," 80.

Figure 1
Tail Light by Stuart Haygarth.

personally with regard to the place it occupies within social relations; it thus becomes invested emotionally rather than monetarily.[37]

In the following section, I concentrate on the issue of trashion as a conduit of disposal and, offering examples, elaborate on the consequences of such transformation for the issue of consumption.

Design as a Conduit of Disposal
Design has now turned into an indispensable aspect of marketing strategies, whereby products are inculcated with added value. Thus, products can be differentiated in the market, tailored to the presumed tastes and choices of socially and culturally differentiated target groups. In this respect, it is not surprising that the world of rubbish has become a treasure for design—a profession considerably involved in the generation of value through a creative process. In this treasure, we find not only objects that are disposed of, but also forgotten styles, archaic technologies, and bits and pieces that never had the chance of acquiring any value. The magic wand of design transforms these worthless, forgotten, neglected, and thrown out items into precious pieces of aesthetic and moral value. In this manner, design opens the door for the trashy to flow toward the world of the valuable and valued.

The Tail Light (see Figure 1), by Stuart Haygarth, constitutes a good example for the issue in question. The light is included on a list of "25 Innovative Re-purposed Home Fittings Designs" generated by FreshBump, a social news medium devoted to the fields of advertising, architecture, computer arts, graphic design, illustration, industrial design, interior design, and photography.

The light, which, as its name suggests, is made of vehicle tail lights, is promoted on the FreshBump website as follows: "A busted tail light can you get pulled over, but it can also give you a creative new light fixture. Artist Stuart Haygarth was inspired by lenses covering vehicle lights, seeing in them something more elevated than banal tail lights."[38] Vehicle lights, which have never been considered objects in their own right, are now "elevated" to the status of a designed object, with an unexpected increase not only in their aesthetical attributes but also in their price. Thus, this trivial, insignificant, plastic thing is successfully commoditized by flowing in the opposite direction in the conduit of disposal.

Another item taken from the same list is the Cassette Cabinet (see Figure 2). In making something from what we have lost through the advances of technology, this cabinet valorizes nostalgia:

> Mixtapes have long been used to commemorate love (and heartbreak), season changes, irrational obsessions with a band, and life milestones. (It's easier to turn 30 when it's to the soundtrack of Aretha Franklin.) Now that we're in

37   Jean Baudrillard, *For a Critique of the Political Economy of Sign* (St. Louis: Telos Press Publishing, 1981), 64-5.

38   "25 Innovative Re-Purposed Home Fittings Designs," *FreshBump*, http://www.freshbump.com/featured/ featured/25-innovative-re-purposed-home-fittings-designs/ (accessed April 1, 2009).

Figure 2
Cassette Cabinet by Patrick Schuur (Photo by
Wouter Walmink).

the compact disc age, you're stuck with cassette tapes filled
with dated music and emotions, but all's not lost. Creative
Barn shows how tapes can serve a more valiant purpose
than collecting dust.[39]

The cabinet, designed by Patrick Schuur, was made by placing 918
cassette tapes on a wooden frame structured to create a spacious
storage area. It endows the once-useless mountain of garbage with
a new function. In addition, this monument of archaic cassettes
unearths and pays tribute to the distant memories, forgotten
moments, and absent people embedded in those memories.

One last example from the list is the mattress chair, Madam
Rubens, designed by Frank Willems (see Figure 3).[40] In the design-
er's description, "Madam Rubens is a plump but sophisticated lady
after an extreme makeover. She started her life as a mattress but
was thrown away after years of loyal service."[41] Recognizing that
mattresses cannot be recycled, the designer develops this solution,
guided largely by an environmentalist responsibility. The chair is
a combination of a disposed mattress and the legs of an antique
chair. For each chair, the mattress is folded in a different way and
combined with different chair legs to assure that Madam Rubens is
unique every time. The chair also is painted in a bright vivid color
of choice to complement its newish look. Thus, "Madam Rubens is
back in business as a fresh, hygienic, and exceptionally stylish tool."[42]

If these old-fashioned table legs were not combined in such an
innovative manner with an already discarded mattress, they would
likely be thrown away to be replaced by brand-new minimalist ones
and would never be re-placed in the first place, at home. Moreover,
the mattress, which has never been put on display before, steps up
to the living room as an object of distinction. Any traces of outdated-
ness and mediocrity are erased and re-valued through a redefined
function and a chic appearance. In this case the style is rescued
from the past and its remnants, translated through the conduits of
disposal, are transformed into a new design language.

All these translations can be considered reincarnations or
rebirths, following Hetherington's adaptation of the two-phased
burial practices in certain cultures that are introduced by Hertz to
the realm of inanimate objects. The first place of burial for the objects
can be "the bookcase, the recycle bin on a computer, the garage,
the potting shed, the fridge, the wardrobe, even the bin" in which
the objects are left for some time "while their uncertain value state
is addressed . . . before being removed into the representational
outside, where they undergo their second burial in the incinera-
tor, the landfill, or unfortunately sometimes just fly-tipped onto the
side of the road."[43] The interval between the two processes is of great

39   Ibid.
40   Ibid.
41   Frank Willems official webpage, http://
     www.frankwillems.net/ (accessed
     October 24, 2011).
42   Ibid.
43   Hetherington, "Secondhandedness," 169.

Figure 3
Madam Rubens by Frank Willems.

importance for the purposes of re-valuation. Only after the second burial can we manage to totally be rid of the object; in other words, "only when all forms of value have been exhausted or translated and thereby stabilised will the object be permitted to undergo its second burial."[44]

But making sure that the second burial is accomplished it is not really possible. And failure in this second burial brings all these objects back, endowed with a higher status as designed objects. In their new status, the objects gain all the possible values: use value, exchange value, and sign value. Different from collection objects, these endowed objects enter into all possible spheres of exchange, or they come back as totally commoditized. They are no longer ordinary objects of everyday use but are elevated to the status of what is aesthetically tasteful, "classy stuff." In this place the power of this rebirth lies. Design, as a conduit of disposal, reintroduces rubbish as objects of distinction, invaluable and potentially priceless. People are often eager to see objects that were once considered useless and tasteless when they have been invigorated with new life.

44   Ibid.

Human-Centered Design as a Fragile Encounter

Marc Steen

1   I. F. Sleeswijk Visser, P. J. Stappers, R. Van Der Lugt, E. B. N. Sanders, "Contextmapping: Experiences from practice," *CoDesign* 1:2 (2005): 119-49.

2   M. Steen, "Tensions in Human-centered Design," *CoDesign* 7:1 (2011): 45-60.

3   ISO, ISO 13407: *Human-Centred Design Processes for Interactive Systems* (Geneva, Switzerland: ISO, 1999).

4   S. Kujala, "User Involvement: a Review of the Benefits and Challenges," *Behaviour and Information Technology* 22:1 (2003): 1-17.

5   M. Muller, "Participatory Design: The Third Space in HCI," in *The Human-computer Interaction Handbook: Fundamentals, Evolving Technologies and Emerging Applications*, J. Jacko and A. Sears, eds. (Mahwah, NJ: Lawrence Erlbaum Associates, 2002) 1051-68.

6   M. Steen, *The fragility of human-centred design*, PhD dissertation (Delft University of Technology, 2008).

7   For a discussion of combining design practice, design study, and design exploration, see, e.g.: D. Fallman, "The Interaction Design Research Triangle of Design Practice, Design Studies, and Design Exploration," *Design Issues* 24:3 (Summer 2008): 4-18.

8   B. Latour, *Science in Action: How to Follow Scientists and Engineers Through Society* (Milton Keynes, UK: Open University Press, 1987).

9   W. Bijker, T. Hughes, and T. Pinch, eds., *The Social Construction of Technological Systems* (Cambridge: MIT Press, 1987).

Many innovations in the information and communication technology (ICT) industry are driven by technological developments, rather than by concerns for users' needs and preferences. This *technology push* approach brings a risk of creating products or services that people cannot or do not want to use. In some projects, however, people conduct human-centered design (HCD) as an alternative approach. In HCD, diverse experts, such as designers and researchers, cooperate with potential users—who are "experts of their experiences"[1]—to bring users' ideas and knowledge into the innovation process and to jointly articulate problems and develop solutions.

The term HCD is used here to refer to a broad range of approaches, including participatory design, the lead user approach, co-design, ethnography, contextual design, and empathic design.[2] HCD is based on four principles: 1) involving users to better understand their practices, needs, and preferences; 2) searching for an appropriate allocation of functions between people and technology; 3) organizing project iterations in conducting the research and generating and evaluating solutions; and 4) organizing multi-disciplinary team work.[3]

Kujala, in her review of the benefits and challenges of early user involvement in the ICT industry, concluded that "User involvement is clearly useful and it has positive effects on both system success and user satisfaction."[4] However, she adds that "Involving users is not an easy task for designers. Early involvement of users appears to be promising, on the condition that user involvement methods are developed further and the roles of users and designers are carefully considered."

Indeed, realizing the principles of HCD in practice is "not an easy task." In projects on which I have worked, I experienced tensions between HCD principles and HCD practices, and I expect others to have had similar experiences. For example, when we conduct *participatory* design, we usually set an agenda for a workshop with users. This agenda steers users' participation; as a consequence, we might miss topics that are not on our agenda but are nevertheless relevant to the users and to the project. When

10 J. Ingram, E. Shove, and M. Watson, "Products and practices: Selected concepts from science and technology studies and from social theories of consumption and practice," *Design Issues* 23:2 (Spring 2007): 3-16; and E. Woodhouse and J. W. Patton, "Design by society: Science and Technology Studies and the Social Shaping of Things," *Design Issues* 20:3 (Summer 2004): 1-12.

11 B. Latour, *Aramis, or the Love of Technology* (Translated by Catherine Porter) (Cambridge, and London, UK: Harvard University Press, 1996); M. Akrich, M. Callon, and B. Latour, "The Key to Success in Innovation—Part 1: The art of interessement," *International Journal of Innovation Management* 6:2 (2002): 187-206; and M. Akrich, M Callon, and B Latour, "The Key to Success in Innovation—Part 2: The Art of Choosing Good Spokespersons," *International Journal of Innovation Management* 6:2 (2002): 207-25.

12 K. Knorr Cetina, "Laboratory studies: The Cultural Approach to the Study of Science," in S. Jasanoff, G. E. Markle, J. C. Petersen, and T. Pinch, eds. *Handbook of Science and Technology Studies* (London, UK: Sage, 1995), 140-66; and B. Latour and S. Woolgar, *Laboratory life: The Construction of Scientific Facts* (2nd ed.) (Princeton: Princeton University Press, 1986).

13 L. Haddon, E. Mante, B. Sapio, K.-H. Kommonen, L. Fortunati, A. Kant, eds., *Everyday Innovators: Researching the Role of Users in Shaping ICTs* (Dordrecht, The Netherlands: Springer, 2005); B. Edvardsson, A. Gustafsson, P. Kristensson, P. Magnusson, and J. Matthing, eds., *Involving Customers in New Service Development* (London, UK: Imperial College Press, 2006); N. Oudshoorn and T. Pinch, eds., *How Users Matter: The Co-construction of Users and Technology* (Cambridge, and London, UK: MIT Press, 2003); and H. Rohracher, ed., *User Involvement in Innovation Processes: Strategies and Limitations from a Socio-technical Perspective* (Munich, Germany and Vienna, Austria: Profil Verlag, 2005).

we conduct *empathic* design, we bring a specific interest to an interview and focus on topics that seem to be directly relevant to our project. As a result, however, we might overlook aspects of users' experiences that are important to them but that might seem, at first glance, to be "off-topic." In such cases, we might miss the kind of participation and input from users that we are looking for; HCD can help us to "*learn something that we didn't know we needed to know.*"[5]

Such experiences motivated me to study what happens in HCD *practices* and how the practices differ from HCD *principles.* Based on experiences in two projects, in which I worked and in which I studied as participant observer,[6] I explored an alternative view of HCD.[7]

Science and Technology Studies
The study presented here can be situated in the field of science and technology studies (STS), a multi¬disciplinary field in which social scientists, historians, philosophers, and others examine how people create and apply science and technology. People engaged in STS try to open the "black box"[8]—to show what normally remains hidden and thus to reveal how science and technology are created and applied. They are interested in the "social construction"[9] of technology—in the ways people interact and negotiate with each other while they construct and apply artifacts. Knowledge from STS (e.g., about users' roles and social practices) can be used to improve design practices, and to discuss the role of design in a broader societal and political context.[10]

A dominant perspective in STS is actor-network theory (ANT), in which the creation or application of science or technology is conceived of as a process in which different actors (or *actants*, to include not only people, but also things) form a network and influence each other, as well as the science or technology that is being created or applied.[11] In an HCD project, we can easily imagine that users have less influence than the project team members, who bring their agenda and their focus to workshops and interviews with users.

Since the early "laboratory studies,"[12] which focused on scientists' or engineers' practices, the scope of STS has widened. STS scholars now are also interested in, for example, the roles of users in innovation processes.[13] This study reflects and corresponds with this trend because the focus is on how HCD practitioners interact with users and with other project team members,[14] with the goal of opening the "black box" of HCD.[15] Thus, my approach is similar to a socio-cultural perspective, which, for example, Bucciarelli developed to describe design as a process of people interacting and negotiating with each other.[16] In the next section, I explore an alternative perspective on design that complements the current ANT and socio-cultural perspectives.

14 Please note that, in my study of these
    projects, I focused on the practices
    of project team members, whereas in
    the projects studied, we tried, of course,
    to focus on users.

15 This study fits into a trend to move
    from studying design practices in
    laboratory settings toward studying
    design practices "in the field." This
    trend can be illustrated by a series
    of PhD dissertations from Industrial
    Design Engineering of Delft University of
    Technology: K. Dorst, *Describing design:
    A comparison of paradigms*, 1997; R.
    Valkenburg, The Reflective Practice
    in Product Design Teams, 2000; M.
    Kleinsman, Understanding Collaborative
    Design, 2006; and F. Sleeswijk Visser,
    Bringing the everyday life of people into
    design, 2009.

16 L. Bucciarelli, *Designing Engineers*
    (Cambridge, and London, MIT Press,
    1994). Other examples are: N. Cross, H.
    Christaans, and K. Dorst, eds., *Analysing
    Design Activity* (Chichester, UK: John
    Wiley & Sons, 1996); D. Vinck, ed.,
    *Everyday Engineering: An Ethnography of
    Design and Innovation* (Cambridge, and
    London, MIT Press, 2003); J. McDonnell
    and P. Lloyd, eds., *About: Designing:
    Analysing Design Meetings* (London,
    Taylor and Francis, 2009).

17 Although there are differences between
    these two philosophers, there are several
    key parallels, and their philosophies
    can be combined productively. See: S.
    Critchley, *The Ethics of Deconstruction:
    Derrida and Levinas*, 2nd ed. (Edinburgh:
    Edinburgh University Press, 1999): 9-13.

18 Philosophers often use words in
    particular ways. For a discussion of
    Levinas's use of "autre/Autre" ("other")
    and "autrui/Autrui" ("Other"), see, e.g.,
    Critchley: *The Ethics of Deconstruction:*
    8. For a discussion of Derrida's use of
    "différance," see, e.g., J. Derrida, "From
    'Différance' in Margins of Philosophy"
    in *A Derrida reader: Between the blinds,*
    P. Kamuf, ed. (New York: Columbia
    University Press, 1991): 59-79.

19 J. Keulartz, M. Schermer, M. Korthals,
    and T. Swierstra, "Ethics in Technological
    Culture: A Programmatic Proposal
    for a Pragmatist Approach," *Science,
    Technology, & Human Values* 29:1
    (2004): 3-29.

Exploring Ethics

On the basis of participant observations of HCD practices, as well as on the works of French philosophers Emmanuel Levinas (1906-1995) and Jacques Derrida (1930-2004),[17] I explore an alternative perspective on HCD. I propose understanding HCD as a process in which diverse people participate and move between *other* and *self,* and between *openness* and *closure.* I see HCD as a *fragile encounter* between people, as an encounter that can be beautiful, and as an encounter that can easily break.

Importantly, in drawing from Levinas and Derrida, I introduce a specific type of ethics that is different from, for example, deontological ethics (which focuses on moral rules, duties, and reasoning), or consequentialist ethics (which deals with the positive or negative consequences of moral choices). The ethics of Levinas and Derrida are primarily concerned with the encounter between *other* and *self,* and with *otherness* or *différance.*[18] In the ethics of Levinas and Derrida, we always find ourselves within *other-self* relations— within ethical relations.

Both practical and theoretical motivations are behind this choice. Practically, I want to move away from the language of ANT, which is derived from "war and power struggles" and speaks of "allies and opponents, strategic negotiations, and tactical manoeuvres."[19] Instead, the tradition of participatory design[20] is more appealing to me, in that it conceptualizes power within a context of striving for democracy, participation, and emancipation. My goal is to foster cooperation in HCD projects, rather than promote competition, and to encourage HCD practitioners to reflect critically on their own practices and to better align these with the potential of HCD.

Theoretically, I want to explore an alternative perspective on design that draws attention to the ethical aspects of HCD. This move can be understood as a response to Winner's[21] critique of studies in STS regarding their lack of attention to ethics and their "apparent disdain" for moral questions. Van de Poel and Verbeek similarly proposed to "perform a context-sensitive form of ethics"[22] —to study people's situated and actual practices in a design process, rather than studying the ethical consequences of the outcomes of a design project (as is commonly done).

Deconstructing Human-Centered Design

My study aims to *deconstruct* HCD in the sense of Derrida's approach to deconstructing texts.[23] Such deconstruction involves reading between the lines, questioning implicit assumptions and dominant meanings, exploring alternative readings, and writing these in the texts' margins. In my case, I questioned assumptions implicit in current practices and explored alternative practices.

20   P. Ehn, *Work-oriented Design of Computer Artifacts* (Stockholm, Sweden: Arbetslivs centrum, 1988); J. Greenbaum and M. Kyng, eds., *Design at Work: Cooperative Design of Computer Systems* (Hillsdale, NJ: Lawrence Erlbaum, 1991); and D. Schuler and A. Namioka, *Participatory Design: Principles and Practices* (Hillsdale, NJ: Lawrence Erlbaum, 1993).

21   L. Winner, "Upon opening the black box and finding it empty: Social constructivism and the philosophy of technology," S*cience, Technology, & Human Values* 18:3 (1993): 362-78.

22   I. Van de Poel and P.-P. Verbeek, "Ethics and Engineering Design," *Science Technology, & Human Values* 31:3 (2006): 223-36.

23   J. Derrida, "Letter to a Japanese friend" in *A Derrida reader: Between the blinds*, P. Kamuf, ed. (New York: Columbia University Press, 1991): 270-6.

24   E. Levinas, "Philosophy and the Idea of Infinity," in *Collected philosophical papers* (Dordrecht: Martinus Nijhoff Publishers, 1987): 48, 50.

25   E. Levinas, "Transcendence and Intelligibility," *in* Emmanuel Levinas: *Basic Philosophical Writings*, A. Peperzak, S. Critchley, and R. Bernasconi, eds. (Bloomington and Indianapolis: Indiana University Press, 1996): 152.

26   E. Levinas, "Transcendence and Height," in *Emmanuel Levinas: Basic Philosophical Writings*, A. Peperzak, S. Critchley, and R. Bernasconi, eds. (Bloomington and Indianapolis: Indiana University Press, 1996): 13.

A key assumption in HCD is that HCD practitioners can be *open* toward *others,* so that they can jointly learn and create—that they can be open both toward users and their experiences and toward co-workers and their backgrounds (ISO 1999, HCD principles 1 and 4). Furthermore, HCD assumes that project iterations can be organized that productively combine divergent, generative phases (toward *openness*) and convergent, evaluative phases (toward *closure*) (HCD principle 3). Moreover, HCD assumes (in this context of user involvement, multi-disciplinary teamwork, and project iterations) that decisions can be made about what the product can do and how people can use it (HCD principle 2). In the next two sections, I examine and interpret these assumptions by using texts of Levinas and Derrida as a lens, by providing examples from two HCD projects, and by exploring alternative practices.

In these two projects, the goal was to develop innovative telecom applications for two different user groups in close cooperation with them: one for police officers and another for informal carers. The projects combined *technology push* (the ambition to develop telecom applications) and HCD (the ambition to cooperate with potential users).

Developing Knowledge: Other and Self, Grasping and Desire
Another key assumption in HCD is that the people involved can jointly learn new things—that they can, for example, develop knowledge about users and their experiences. However, being *open* toward *others* and learning new things can be hard. Several of Levinas's texts can help to discuss this process of developing knowledge.

Throughout his oeuvre, Levinas is concerned with the difficulties of relations between people and the violence that so often occurs between them. He argues that people tend *not* to see the *other* as *other*, but as an object, and to reduce what they see and hear from the other to concepts with which they are already familiar. This tendency can lead to "*the reduction of the other to the same:*" "The foreign being … becomes a theme and an object. … It falls into the network of a priori ideas, which I bring to bear, as to capture it."[24] He characterizes this tendency as a grasping gesture: We pull the other into our own way of thinking: "Knowledge remains linked to perception and to apprehension and to the grasp."[25] Levinas describes the *self*, which he refers to as "the I of knowledge," as a "melting pot where every Other is transmuted into the Same."[26] Thus, in an attempt to develop knowledge, the *self* grasps the *other* and draws the *other* into her or his own "melting pot," which makes learning anything new very difficult.

HCD practitioners cannot escape this tendency. Their interests and ambitions, their methods and skills, and their knowledge and ideas (e.g., their *selves*) make them filter what they see and hear from users and co-workers (e.g., the *others*). This tendency to grasp is illustrated with several examples from the police project.

In this project, we conducted a series of four co-design workshops with different groups of police officers. Based on the findings from each workshop, we gradually changed our project's focus and eventually developed a mobile telecom application that promotes cooperation between police officers. It does so by automatically making suggestions to share "implicit knowledge" between police offices to improve the quality of police work. This type of adaptation of a project, based on interactions with users, is considered good practice in HCD.

Nevertheless, we also missed several opportunities to learn from police officers and to let their ideas significantly influence the project. In the interactions between us (the project team members) and them (the police officers), we often privileged our own ideas over theirs. For example, in the first workshop, we jointly explored and articulated four areas that they (the police officers) experienced as problematic. After the workshop, however, we (the project team members) chose to focus on the one area that was comfortably close to our ambition to develop a telecom application. As a consequence, we ignored the other areas relevant to the police officers, such as the problems they experience with systems they use to share and access information, and their experiences of struggling with their professional roles and the organizational culture.

Another example comes from the second workshop, in which we discussed our observation of police work (conducted some weeks earlier) to validate our findings. In this workshop, the police officers confirmed the problems we had identified. In addition, they wanted to discuss some practical problems, such as their need to have laptops in their cars to access information remotely. We responded that our project focuses on developing innovative telecom applications and not on their current practical problems. We privileged our ambitions over their practical needs.

These examples illustrate a question that HCD practitioners often face: How do we balance users' concerns with the project's ambitions. This question is central in the participatory design tradition. Based on Levinas, this tension can be rephrased: How do we balance the ambition to be *open* toward the *other* with the tendency to *grasp* the *other,* and to privilege the *self* over the *other*?

Applying these ideas to HCD, I propose that as HCD practitioners we need to try to be *open* toward *others*. Meanwhile, we also need to bring our *selves:* our interests, ambitions, methods, skills,

knowledge, and ideas. I suggest that we often are unaware of the tensions that occur between *other* and *self,* and of our tendencies to privilege the *self* over the *other*. Moreover, I propose that we can try to become more aware of these tensions and tendencies, so that we can learn to better balance *other* and *self*. One suggestion for doing so comes from Levinas himself. He envisions the possibility of trying to escape the gesture of *grasping*—which is aimed at satisfaction of the *self* at the expense of the *other*—through a form of *desire* aimed not at satisfying the *self,* but at respecting the otherness of the *other*: "This desire is unquenchable, not because it answers to an infinite hunger, but because it does not call for food. This desire without satisfaction hence takes cognizance of the alterity [otherness] of the other."[27]

Making Decisions: Openness and Closure, Programming and Passivity
Not only do HCD practitioners need to move toward *openness,* toward other people's experiences, knowledge, and ideas (divergence); they also need to move toward *closure,* drawing conclusions and delivering results (convergence). Making decisions is critical to combining *openness* and *closure* because making decisions is a way to create closure and to make progress. We explore directions for developing solutions and then choose one, or we generate ideas and then select one. Reading some of Derrida's texts can help to explore an alternative view on the process of making decisions.

Derrida remarked that genuine decisions are "exceptional" decisions: "a decision that does not make an exception, that does nothing but repeat or apply the rule, would not be a decision."[28] One cannot make a genuine decision by merely applying knowledge or simply following rules: "It is when it is not possible to *know* what must be done, when knowledge is not and cannot be determining that a decision is possible as such. Otherwise, the decision is an application: one knows what has to be done, it's clear, there is no more decision possible; what one has here is an effect, an application, a programming."[29] Furthermore, Derrida observed that people often try to *program* innovation and argued that this can lead to "the invention of the same."[30] Because of this tendency to *program* innovation, we tend to stay within our own comfort zone, to move toward *closure,* rather than toward *openness,* which makes it hard to get out of the box and create anything new. The difficulty of combining *openness* and *closure* and the tendencies to *program* innovation are illustrated here with examples from the informal care project.

In this project, we cooperated with informal carers—more specifically, with people who provide "primary" informal care for people who suffer from dementia and who live at home, often their husband or wife. In this case, different project team members

27 E. Levinas, "Philosophy and the Idea of Infinity," 56.

28 J. Derrida, "Deconstructions: The Im-possible" in *French Theory in America*, S. Lotringer and S. Cohen, eds. (New York and London: Routledge, 2001): 29.

29 J. Derrida, "Dialanguages" in *Points… Interviews*, 1974-1994, (Stanford: Stanford University Press, 1995): 147-8.

30 J. Derrida, "Psyche: Inventions of the Other," in *Reading de Man Reading*, L. Waters and W. Godzich, eds. (Minneapolis: University of Minnesota Press, 1989): 46, 55.

followed different approaches to talk with potential users about their daily lives and their needs. Some project team members who were familiar with dementia and informal care conducted a questionnaire-based survey (within a psychology tradition). They interviewed hundreds of people with dementia and their "primary" informal carers to generate a representative overview of their needs. In parallel, other project team members, for whom dementia and informal care were relatively new areas, conducted informal co-design interviews (within a design tradition) to inform and inspire their creative process. Both approaches are attempts to move toward *openness*, to learn from potential users. However, they are also moves toward *closure*—drawing conclusions about people's needs and creating products for them.

Because of our chosen methods (from psychology and from design), we tended to move toward *closure* rather than toward *openness.* The people involved in the survey used questionnaires, and the respondents' utterances had to fit into the questionnaire's categories. Meanwhile, the people involved in the co-design interviews started with the ambition to create a telecom application, and this ambition influenced the way the interviews proceeded. HCD practitioners bring their methods to the encounters with others as a way to focus, to stay on track, and to move toward *closure.*

Because of the different methods used for conducting the interviews, the findings were also hard to combine within the project team. Moreover, the different approaches to making decisions were hard to combine. Coming to agreement about which target group to focus on and which need to address took considerable effort by the project team. The people involved in the survey (who had lots of experience with dementia and informal care) advocated focusing on the informal carers' needs and developing a telecom application that to help informal carers share tasks with others, to alleviate their burden. Such an application would prevent "primary" informal carers from burning out and thus would improve the quality of life for both the informal carer and the care receiver who has dementia. In contrast, the people involved in the co-design interviews advocated focusing on the needs of the people with dementia— probably because they were moved by these people's condition and their needs (which were relatively new to them).

I suspect that HCD practitioners are not always aware of the effects that their backgrounds and methods have on the decision-making process; of the tensions that occur between *openness* and *closure*; and of their tendencies to *program* innovation and to favor *closure* over *openness.* Moreover, I propose that by trying to become more aware of these tensions and tendencies, they might find a better balance between *openness* and *closure.* Derrida offers a suggestion of how to do so. Similar to Levinas, Derrida advocates

welcoming the *other*—trying to let the other surprise you—to escape the tendency to program: "To invent would then be to 'know' how to say 'come' and to answer the 'come' of the other."[31] Such an approach would be an active form of passivity because trying *not* to make the other into a theme within our own "program" requires an effort: "Letting the other come is not inertia open to anything whatever. No doubt the coming of the other … escapes from all programming."[32]

Advocating for Reflexivity

HCD can be understood as a *fragile encounter*—an encounter with inherent tensions, in which people try to move toward the *other* and toward *openness* but in which their tendency is to move toward the *self* and toward *closure*. We often are not aware of these tensions and moves, which makes it hard to counter these tendencies. Several suggestions offered can help HCD practitioners to realize more of the potential of HCD. These suggestions extend our current attempts to be sensitive and responsive to the people we interact with: both to potential users and to other project team members. We who are HCD practitioners can try to become more aware of the moves we make between *other* and *self*, and between *openness* and *closure*, and of our own roles in the HCD process. Being more aware of these moves and roles might help us try to bring about two important changes: 1) engaging with a form of *desire* that is open to the other, we may counter our tendencies to *grasp* the other and, in doing so, facilitate joint learning; and 2) engaging with a form of *passivity* that welcomes otherness, we may counter our tendencies to *program* innovation and, in doing so, facilitate joint creativity.

As HCD practitioners we can try to better balance our own interests, ambitions, methods, and skills with users' and co-workers' interests, ambitions, methods, and skills. We can organize workshops or interviews with a more open mindset. We can, of course, continue to use agendas or checklists, as long as we recognize how these methods influence the process and our roles in the process. My suggestions boil down to advocating reflection (on the HCD process) and reflexivity (concerning one's own role in this process). Such advocacy is not new to people in the tradition of participatory design.[33]

What, then, might HCD look like? I invite you to try this: Close your eyes and imagine yourself participating in a workshop with potential users and other project team members. You are aware of the project's goal to design a product and of your own ambitions and skills. You want to create things and make progress. But you also try to be open toward the others as you put your own knowledge and ideas on hold. Imagine them as secondary. You catch yourself trying to formulate conclusions and envision solutions and try to counter these. For the moment, you notice that you are leaning

31 J. Derrida, "Psyche: Inventions of the Other," 56.

32 J. Derrida, "Psyche: Inventions of the Other," 55-6.

33 E. Beck, "P for Political: Participation is Not Enough," *Scandinavian Journal of Information Systems* 14:1 (2002): 77-92; S. Bødker, "When Second Wave HCD Meets Third Wave Challenges," *Proceedings of NordiCHI* 2006, October 14-18, 2006, Oslo, Norway (2006) 1-8; J. Gulliksen, Ann Lantz, and Inger Boivie, *User Centered Design in Practice: Problems and Possibilities* (Stockholm, Royal Institute of Technology, 1999); and R. Markussen, "Dilemmas in Cooperative Design," *Proceeding of Participatory Design Conference* (1994) 59-66.

forward, opening your mouth to say something. Then you pull back, close your mouth again. You breathe slowly in, and out. You look at the other and you listen to her. You become curious about her, and you begin to wonder. What would it feel like to experience what she talks about? You begin to appreciate her participation. You are interested in her perspective and ideas. You empathize. You feel less hurried, and you are aware of the flow of the meeting, of what happens in the encounters between the people present, between others and you.

This scenario would come close to what HCD practices can be: encounters between people in which they can jointly learn and jointly create.

The Quiet Dissemination of American Modernism: George Sakier's Designs for American Radiator
Christine Taylor Klein

George Sakier was a versatile practitioner who worked as an interior designer, painter, art director, engineer, and packaging designer. He was also one of the original industrial designers in America. His career path was as diverse as it was extensive, and his impact upon the development of a modern design aesthetic pervaded not only in the United States but also in Europe.

To understand Sakier's ability to produce designs that have become so pervasive in the American household, one must look to his earlier career—a period of time that Fortune magazine called his "trek from camouflage to bathtubs."[1] During this era, particularly in the 1930s, Sakier emerged as an arbiter of modernism and as one of the first industrial designers. His bathroom and kitchen fixture designs for the American Radiator Company reveal some of the earliest embodiments of a uniquely American modernist style. Through the market appeal and affordability of his industrially designed products, Sakier quietly disseminated his modern aesthetic throughout the country.

From Camouflage to Bathtubs

Sakier's father, Samuel, immigrated to Palestine as a member of the Bilu'im—a group of Zionists who fled Russia during the 1880s to avoid the anti-Semitic "May Laws" of Tsar Alexander III.[2] The Bilu'im were trailblazing idealists that established an agrarian cooperative society.[3] Life in Palestine was fraught with disease and drought, and by the turn of the century, Samuel left the farming experiment to settle in New York City, where he married and worked as a paper and twine merchant.[4] George was born the second of three children in December 1897. Although the family could not have been considered wealthy, each of the three children was given a high level of education. While both his siblings remained closely involved with their Jewish heritage (his older Brother Abraham was an ardent supporter of the Zionist movement and his younger sister Helen was an active board member of a prominent Jewish social agency), George took a different path. His early exposure to

1 George Nelson, "Both Fish and Fowl," *Fortune* (February 1934), 40.

2 Sakier's descendents believe that the original family name may have been "Sirkin" and that Samuel, like many Jewish immigrants of his time, may have changed his name when he moved to the United States.

3 For more on the BILU Movement, see: Samuel Kurland and Hechalutz Organization of America, *Biluim, Pioneers of Zionist Colonization* (New York: Pub. for Hechalutz organization of America by Scopus publishing company, 1943).

4 "Samuel Sakier," *New York Times*, January 4, 1934. This obituary claims that Samuel "settled in New York about 1900," but given that George was born in 1897 and that George's older brother Abraham was also born in New York, it is likely that Samuel arrived in the US as early as 1894.

5   "George Sakier | Industrial Designers
     Society of America - IDSA", n.d., http://
     www.idsa.org/content/george-sakier
     (accessed October 12, 2011).

6   "Faking as an Art in Conducting War,"
     New York Times, June 24, 1917.

7   "Call for 'Fakers' to Fool Germans," *New
     York Times*, September 4, 1917.

8   Leslie A. Piña, *Fostoria: Designer George
     Sakier* (Schiffer Pub., Atglen, 1996),
     14. This text, written for present-day
     collectors of the many Fostoria glassware
     designers, offers the only cohesive
     biographical study on Sakier and was
     a great asset to this study.

9   Nelson, "Both Fish and Fowl," 97.

European modernism, and perhaps to the social messages implied therein, seems to have determined the direction of his work (see Figure 1).

Growing up in Brooklyn, Sakier was educated as an engineer at the Pratt Institute and Columbia University, where his evident talents in the field led to his authorship of the textbook, *Machine Design and Descriptive Geometry*, at the age of only 19.[5] His interest in art and painting apparently began during his military service; in 1917, he joined the newly formed Camouflage Corps, for which he designed and painted camouflage patterns.

Designed concealment was a relatively new concept at the time; the American Armed Forces had learned of it from the French army, which before the war established an organized corps of young and promising artists, architects, and set designers. Sakier's own training for the Camouflage Corps began at Columbia University, where he and other young artists studied the new concept of camouflage. Military recruiters touted camouflage as "one of the newest military arts—the art of concealing things from hostile observation . . . by painted canvas."[6] The role of the newly appointed *camoufleur* was to follow soldiers into battle, where he would use his artistry to "spread his best imitation of the magic veil of invisibility" to protect the new technologies and weapons that were being used against the Germans.[7]

Whether Sakier's time with the Camouflage Corps brought him to Europe is unclear; however, we do know that in 1922, after his service, he traveled on his own to France by freighter. After touring the European Continent, he stayed in Paris through the next several years, writing articles for various publications to make money while he began to investigate his abilities as a painter.[8] His paintings, typically figural or landscapes, would remain the great passion in his life, and when he had amassed his fortune from his industrial design pursuits, he moved to Paris to spend the rest of his life focusing on art.

His years spent abroad in the 1920s were concurrent with the most crucial formative moments of early modern design. Among them was the Paris 1925 *Exposition des Arts Décoratifs et Industriels Modernes*, which offered many Americans their first glimpse into the realm of modernism—an experience that would inspire not only the future of American modernism but the later emergence of industrial design as a professional field. But Sakier was not content to follow French trends. As a contributor to numerous European periodicals in France, he was able to encourage the Trocadéro Museum to mount an exhibition of a sizable collection of Mayan artifacts that had previously lain dormant in the museum's storage cellar—thus proving "to the French that America had an ancient art."[9] This exhibition was for Europeans a very early nod toward the acceptance of any form of artistic authority from the Americas, and its creation was not the only time that Sakier would

influence the design discourse abroad. A decade later, when his glassware designs for Fostoria first began receiving wide acclaim, he would again influence the European modern aesthetic when "he won the distinction of having his own designs for glass pirated in Europe."[10]

Sakier returned to New York around 1926. While in Europe, he had gained experience as an assistant art director for French Vogue, and he worked as art director for *Modes and Manners* and *Harper's Bazaar* until the end of the decade.[11] By then, he had also secured jobs as head designer at the American Radiator and Sanitary Corporation and as a consultant designer for Fostoria Glass Company. His service with both companies would last for decades, and his work led him to wide acclaim in the new realm of industrial design.

Fostoria, under whose employ Sakier made his most lauded and recognizable work, was founded in 1887 in Fostoria, OH. The location for the original factory was chosen "to take advantage of the free natural gas offered [there] as an inducement to industrial users with the money to set up a factory."[12] The company later moved to West Virginia; Sakier would send his designs here for elaboration by an in-house design team, and the products would be manufactured and marketed to middle-class households all over the country. Sakier was hired as part of Fostoria's aggressive design overhaul—an attempt to keep pace with the competition by modernizing its wares.[13] Under his direction, the company began to offer a broad range of tableware, most of which evinced a combination of neoclassical and modernist sensibilities. Fostoria prospered from Sakier's "simpler, friendlier" modernism, and its success inspired other glassware companies to embrace the trend in the 1930s.[14]

As dynamic and innovative as Sakier's designs were, they often retained classical elements. Because he was designing for the American middle-class consumer, even his more avant-garde glass pieces tended to merely imply modernism rather than to fully embody it. His geometric forms for footed stemware were often accented with classical floral etching; candelabras with geometric accents retained column-like fluting; and goblet stems were topped with detailing similar to Roman capitals.

American Radiator and the Culture of the Bathroom
Sakier's full expression of modern, utilitarian purity and social awareness is most evident and compelling in his work with the American Radiator and Standard Sanitary Corporation. At first glance, plumbing may seem an unlikely catalyst for the proliferation of modern design in America. However, plumbing and its accompanying fixtures are, in fact, rife with modernist implications. Other parts of the house did not lend themselves as readily to such modern advances. "Designers and manufacturers," Kristina Wilson has written, "found it more difficult to argue that a modernist sofa,
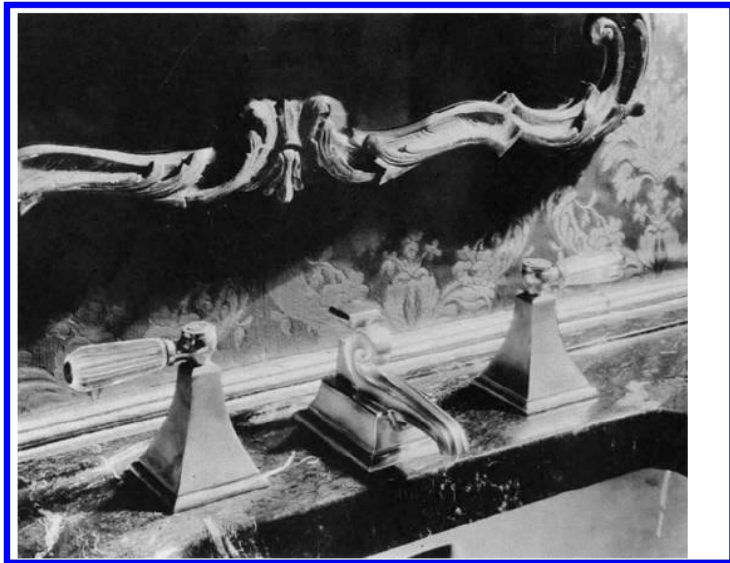
10 Ibid.
11 Piña, *Fostoria*, 8.
12 Charles Lane Venable et al., *China and Glass in America, 1880-1980: From Tabletop to TV Tray* (Dallas Museum of Art, 2000), 174.
13 Ibid.
14 "Notes on Glass Design," Advertising Arts (January 1933), 21. Quoted in Kristina Wilson, *Livable modernism: interior decorating and design during the Great Depression* (Yale University Press in association with the Yale University Art Gallery, 2004).

Figure 2
An example of Sakier's earlier luxury fixtures.
Faucet mounted on black marble sink top.

15   Kristina Wilson, *Livable modernism: Interior Decorating and Design During the Great Depression* (Yale University Press in association with the Yale University Art Gallery, 2004), 12.

16   Adolf Loos, "Plumbers" (1898), quoted in: Nadir Lahiji and Daniel S. Friedman, *Plumbing: Sounding Modern Architecture* (Princeton Architectural Press, NY, 1997), 18.

17   For an excellent discussion on this topic, see Ellen Lupton and J. Abbott Miller, *The Bathroom, the Kitchen, and the Aesthetics of Waste* (Princeton Architectural Press, NY, 1997), 25-40.
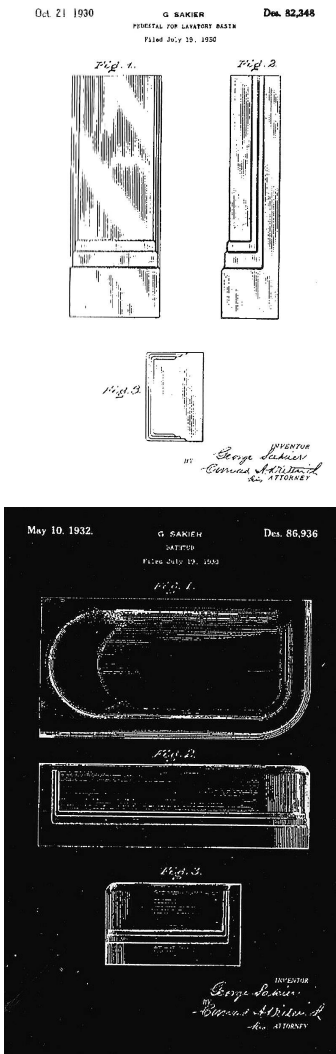
18   Paul T. Frankl, "Baths and Bath-Dressing Rooms," *House and Garden* (August 1927), 51-5. Quoted in Ibid.: 25.

19   Piña, *Fostoria*, 9.

20   Regina Lee Blaszczyk, *Imagining Consumers: Design and Innovation from Wedgwood to Corning* (JHU Press, 2002), 202.

dining chair, or vanity table embodied any sort of technological improvement over their period-styled counterparts."[15] Bathrooms were also particularly American in their implementation and significance. As early as 1898, Adolf Loos had pointed to plumbing as the technological arena where America and England had far surpassed the Germanic culture. For Loos, the culture of the bathroom was an empowering form of national advancement: "For only that nation that approaches the English in water usage can keep pace with them economically; only that nation that exceeds the English in water usage is chosen to overtake them in world dominance."[16] By the 1930s, not only had the modern bathroom become entirely pervasive in the American home, but it was also a completely new typology, suitable for experimentation and innovation by the country's burgeoning field of industrial designers. It appealed to the new consciousness of utility and hygiene, and, better yet, its status as a new design paradigm left it free of the aesthetic restraints of classicism and historicism that were so prevalent in other aspects of domestic design.[17] As Paul T. Frankl pointed out, "Chippendale never designed a bathtub… we have been forced to use our own ingenuity in planning [the bathroom]."[18]

Sakier began working for The American Radiator Company (later the American Radiator and Standard Sanitary Corporation and now known as American Standard) in 1927, as Head of the Bureau of Design Development. He was one of the company's first in-house full time industrial designers, and he remained there through the 1940s.[19] The establishment of a design bureau represented for the company a departure from the tradition of functionality that was common to the plumbing industry at the time.[20] American Radiator hoped to enlist a new level of aesthetics to replace the engineer-driven designs of the past. The bathroom fixtures and lavatory

21 Sheldon Cheney and Martha Smathers
    Candler Cheney, *Art and the machine:
    an account of industrial design in
    20th-century America* (Acanthus Press,
    1992), 78.
22 Ibid.
23 Joseph J. Korom, *The American
    Skyscraper, 1850-1940: A Celebration of
    Height* (Branden Books, 2008), 423.
24 Piña, *Fostoria,* 109.
25 Raymond Hood quote originally posted
    in "What Others Say," a promotional
    brochure for the Neo-Classical line.
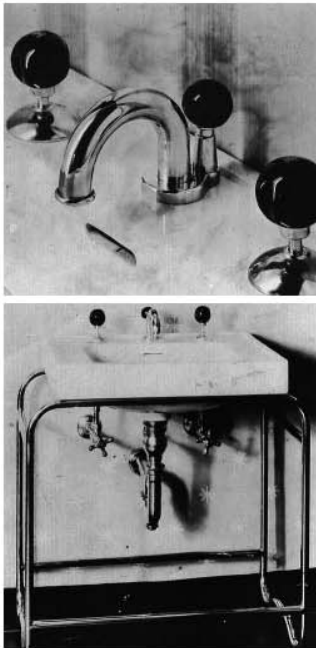   Quoted in: Ibid., 113.

panels that Sakier designed for the company would ultimately become his most modern and arguably most influential contributions to industrial design.

In his first years at American Radiator, his designs stayed close to the typical neoclassical forms that drew great interest from upper class consumers (see Figure 2). Critic Sheldon Cheney wrote of his early works, "Sakier was creating exhibition ensembles as luxurious as any of those advertised, for their 'rich and Oriental splendor,' for their Greco-Roman 'period' authenticity, or for their Spanish exoticism."[21] One bathroom design in particular, which included oversized tubs and gold taps, was priced at an opulent $7,000. Despite this application of ornament, Cheney, an ardent modernist, conceded that Sakier's design prowess shone through: "[Sakier's] work was always distinguished by a delicately perceptive discrimination and a genuine originality in new material use."[22]

All of this opulence would, of course, fall away in the aftermath of the economic collapse of 1929, after which Sakier would turn his attention toward a simpler and more astringent aesthetic. Shortly after the market crash, construction began on the new Waldorf-Astoria hotel in New York City. The architecture firm, Schultz and Weaver, designed the remarkable building, then the largest hotel in the world, with more than 2,000 guest rooms and 300 residential suites.[23] Theo Arens, president of American Radiator and Sakier's boss, was determined to win the contract for the bathroom installations, and he set Sakier to work designing an entirely new line of fixtures for the hotel. The result was Sakier's Neo-Classic line, a misleading title given its strong lines and geometric shapes (see Figure 3). In fact, he meant for the name to be interpreted literally; he intended for the fixtures to become the "new classic" for bathrooms. The design established an aesthetic based upon the utilitarian function of the plumbing and machinery with which it operated.[24] Schultz was pleased with the designs, and American Radiator won out over Kohler, the hotel company's previous supplier. The success bolstered Sakier's notoriety, propelling his designs into numerous journals and magazines that praised the work as an embodiment of the emerging machine aesthetic. Architect Raymond Hood, who designed the American Radiator's own high-rise building a few years earlier, remarked that the fixtures had "an architectural character that blends them into the design of the room. They have the basic quality of good design," he added, "of being straightforward and simple."[25]

The Neo-Classic bathroom concept was exhibited in one of the display rooms at The American Radiator and Standard Sanitary Corporation, and, in it, Sakier combined the modernized fixtures with elements of pared-down classicism to achieve maximum appeal to consumers. Walter Rendell Storey, art critic for the *New York Times*, described the fixtures as moving toward a "smart simplicity," where the "old-time fussiness of the ornamented bathroom has been

A *Directoire* Bathroom display room containing Neo-Classic fixtures and pilasters applied to walls.

Figure 5

Chromium plated sink fixtures with tubular steel sink support.

26 Walter Rendell Storey, "Gay Decorations for the Dining Table," *New York Times*, February 28, 1932. The material and color details in the description that follows are also taken from this article.
27 Lupton and Miller, *Bathroom, the Kitchen, and the Aesthetics of Waste*, 38.
28 Piña, *Fostoria*, 112.

eliminated, and a decorative type of interior developed in which all details are unified."[26] Sakier designed the display room, titled the *Directoire Interior*, in its entirety. He intended for the clean lines of the modern fixtures to blend with the more historicized elements of the interior (see Figure 4). Narrow vertical pilasters of dark green marble punctuated the walls. Near their capitals, which were made of gold mirror glass, interpretive frieze panels were set onto the pistachio green walls, and the Neo-Classic porcelain fixtures were a slightly deeper green. A sparse rectangular plate of mirror was mounted above the sink, and a pair of niche shelving units flanked the doorway, which was also left free of molding or decoration. The golden accents of the capitals were mimicked in the faucets and handles of the sink and bathtub. Other than a few tertiary elements, there seemed to be very little coordination between the innovative fixtures and the colorful classical decoration of the background. This may in large part be because in this early incarnation of the modern lavatory, the plumbing industry had yet to challenge the bright color and period styling of domestic interiors. This shift would occur gradually throughout the 1930s, particularly with the increased emphasis on hospital-like cleanliness.[27]

One of Sakier's most popular lavatory stands from the early 1930s was especially emblematic of this machine-age aesthetic (see Figure 5). Geared toward mass production, the sink's design was minimalistic in its components, and the fixtures recalled a geometric purity coupled with durable and distinctly modern materials. The supporting framework for the porcelain basin was composed of tubular steel, and although the material had been popular in European furniture design since the mid-1920s, this represented one of the earliest adoptions of the material in the United States (Sakier filed for a patent of his design in 1930.)[28] The steel tubing was not simply a reflection of the European vanguard; in many ways, it was representative of a newly integrated system of plumbing. The steel tubes referenced the piping mechanics of a modern system of water transfer and waste disposal. This thin, sleek, steel element did not conceal the lavatory's inner workings; instead it exposed the supply pipes and plumbing fixtures that serviced the basin and incorporated them into the overall design. It was rounded at all corners, emphasizing the ease and temporality of installation and use; this was not a unit for permanent use, but rather one that could be removed and replaced. Not only did the minimal tubing imply a high level of hygienic control, but it was also highly functional. The steel support was strong enough to support the porcelain basin, and horizontal members along the sides of the framework provided lateral support while also serving as convenient towel racks.

The sink's fixtures were also representative of their functionality. The water supply and drain control knobs were made of durable porcelain, and their spherical form adhered to an aesthetic of geometric purity. The faucet is chromium-plated metal,

Figure 6
The lavatory system in a display room.

and its tubular form mimics that of the basin's steel supports. Its rounded profile provided a steady downward stream of water while also mirroring the bend of the exposed pea trap below the basin. These elements served to further relate the lavatory's aesthetic to its function, while evincing Sakier's ability as an arbiter of the new form language. In a true sign of the modern age, this lavatory was reportedly chosen for the restrooms in the Atlantic Clipper, Pan-American's groundbreaking transcontinental luxury "air boat" that took to the skies in 1939.[29]

The display room that Sakier designed to showcase this particular washbasin departed in marked ways from his earlier Neo-Classic showroom (see Figure 6). Again, we note the contrast of the stark, modern fixtures against a brightly colored interior. The wall coverings are of spun glass in alternating bands of sea green and white, and the floor is sand-colored linoleum with black inlay.[30] But here the similarities end. Although the integrated bathtubs in both showrooms were from the Neo-Classic line, the abrupt chamfered edge of the original was now rounded for a more streamlined effect. This streamlining was reiterated in the curved corners of the display room walls and the sleek tubular elements of Sakier's sink. Absent were the overt classical references, so insistent before. The horizontal banding on the walls was more a nod to the Austrian modernists than to Roman ornament, and the circular mirror and rectangular doorway were positioned as geometric objects rather than traditional elements. Even the spherical light fixture in the center of the room favored a geometric purity over a historical reference. Sakier's designs were beginning to reach beyond their functionality and into the overall aesthetic of the room, resulting in a more cohesive design model.

Sakier's bathroom designs continued to develop and grow in popularity. In a forecast of the designs at the 1933 Chicago World's Fair, fashion editor Virginia Pope wrote of him: "sensing trends is what [he] calls studying 'audience psychology' – keeping ahead of the game."[31] In the new realm of applied art, design was a dynamic, ever-changing process, and businesses depended on this obsolescence to create a constant stream of demand. The American Radiator Company's bathroom exhibition, designed entirely by Sakier, boasted the "latest developments in bathroom design and sanitary plumbing."[32]

The concept of obsolescence, largely a product of industry and its consideration for the consumer's rapidly changing tastes, proved problematic in the area of bathroom fixtures, which were primarily marketed not to the average consumer but instead to the architects and builders who would specify them in new construction. Thus, the equipment was expected to last a good deal longer than other household products and appliances. For example, while Sakier's various new glassware designs for Fostoria could be

29 Harold L. Van Doren, *Industrial Design; a Practical Guide* (New York: McGraw-Hill, 1940), 23. For more information on the Atlantic Clipper, see: Fredrick Graham, "Atlantic Clipper Sails in Like Gull," *New York Times*, February 25, 1939.

30 Walter Rendell Storey, "Unification in Modern Design: George Sakier, Interior Decorator," *The Studio* 123 (March 1942), 68.
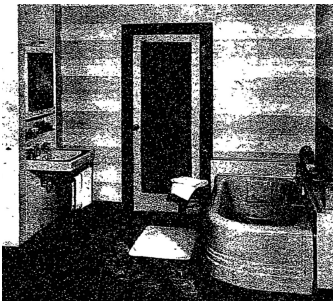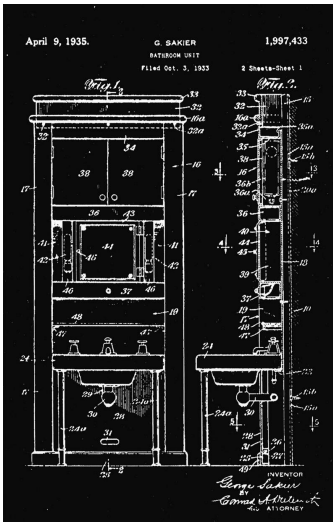
31 Virginia Pope, "Craftsmen Find a Patron in Industry," *New York Times*, August 21, 1932.

32 Century of Progress International Exposition, *Official Guide Book of the Fair*, 1933 (Chicago: A Century of Progress, 1933), 105.

33   Nelson, "Both Fish and Fowl," 97.

34   "Technical News and Research: A Prefabricated Bathroom" *Architectural Record*, (January 1937), 39.

35   Note that *Architectural Record* in 1936 and 1937 consistently refered to these panels as "*Arcode* Sectionals." Elsewhere, the systems are referred to as Arco.

36   Cheney, *Art and the machine*, 79.

37   Walter Rendell Storey, "Ease and Style in Outdoor Furniture," *New York Times*, June 18, 1933.

38   "Technical News and Research: A Prefabricated Bathroom," 46.

continuously added to production with little risk of outdating the previous lines, the tolerance for such rapid change, and subsequent obsolescence, in the bathroom was considerably lower. Because of the permanence of the fixtures and the organization of the laborers, the bathroom and plumbing industry was generally slower to respond to new technologies. Aside from its inherent reluctance to innovation, the plumbing fixture industry was also facing a growing number of charges of an even greater economic and social nature. George Nelson, in a 1934 piece for Fortune on the new vocation of industrial design, cited this social neglect as leading to the "basic indictment of the reactionary building industry which, in an industrial capitalistic country, is technologically unable to build houses cheap enough to house two-thirds of the people above a minimal standard of decency."[33] An article in *Architectural Record* pointed out that, despite the relative achievements of American plumbing, a 1934 study of 64 typical cities revealed that "5% of all dwellings had no running water, 13.5% had no private indoor water closets, 20.2% had neither bathtubs nor showers."[34]

Sakier answered this social charge with his design for the first prefabricated bathroom, the Arco Unit Panel System, released in 1933 for the Accessories Company, a division of American Radiator (see Figure 7).[35] Cheney called it Sakier's "machine for cleanliness"—the bathroom's response to Le Corbusier's visualization of the home as a "machine à habiter."[36] The system consisted of three separate components—a washbasin, bathtub, and toilet—each containing all the necessary fixtures and accessories in an adjustable metal wall section for easy installation in new construction or joined to existing plumbing for renovation work. The three main components, along with additional paneling for the flooring and walls, could be interlocked to create a single unified system, or each part could be used separately, depending on need and budget. The lavatory unit, by far the most complex and inclusive, contained a porcelain bowl with tubular metal legs and chromium-finished faucet components. The sink element was attached to a wall panel six to eight inches deep—deep enough to conceal the plumbing pipes and to avoid disturbing the building wall. The panel included shelving and a mirrored medicine closet, bordered by lighting that conveniently plugged into the nearest wall socket. The panel was made of two vertically telescoping pieces to accommodate rooms of various heights, and the sink legs easily adjusted to account for uneven floors.[37] The toilet component held the tank within the wall unit to remain accessible for quick repairs and, once again, to avoid any pipe installation within the building's walls. An available option in this unit was a convector radiator, capable of heating an 8' x 10' room, particularly in the area of the toilet.[38] And, of course, the colors and finishes of each component were customizable to suit the consumer's taste. The system was a revolutionary contribution to the

development of prefabrication and industrial design in America. Its high functionality and technical beauty earned the Arco Panel Unit System a position in the influential Machine Art exhibition at New York's Museum of Modern Art (MoMA) in 1934.[39]

The entire system was designed to optimize comfort in use and convenience in installation, while also imparting a modernist look. More importantly, it was intended to be readily affordable and widely applicable. The same year as the MoMA exhibit, it was reported that 133 of the units were being installed in an apartment building in Washington, DC, and 400 more were slated for installation in another building.[40] Within a few years, the Arco Units were installed in thousands of homes and apartments.[41] The immediate interest in the concept seemed to validate Sakier's social initiative and design ideal. However, the project never reached the level of commercial success that his other lines with American Radiator enjoyed. Like so many other attempts to market prefabricated components in the 1930s and 1940s, including several later efforts by Buckminster Fuller, the unit was never adopted as a prototype. Perhaps consumer interest waned when presented with such a rigidly modernist system; perhaps the consumer could not reconcile the notion of adaptable bathroom components with preconceptions of the architectural fixedness of previous components. Most likely to blame were the plumbers and contractors who failed to evolve in response to the new technology. American architect Alexander Kira reflected on the stubbornness within the "structuring of the plumbing industry, which has followed the pattern peculiar to the home-building industry: field erection and assembly of thousands of independently produced and often unrelated items."[42]

Despite these problems, Sakier continued to investigate prefabrication as a mode of production and installation with the introduction of the "packaged kitchen" assembly for the Accessories Company in 1936. The kitchen panels were intended to complement those of the bathroom system and implemented many of the same design ideals. Steel wall sections, each of which were capable of sustaining a bearing load of 7,000 pounds, were assembled and framed into the house, and the cabinets and equipment were mounted on this system.[43] The system was modular, offering 15, 20, and 35-inch segments to allow for flexibility in arrangement and to accommodate different types of layouts. For a large kitchen with a pantry, the retail price was around $500, but the smaller, straight-line assemblies could run as low as $275. The units were broken down into different construction types to allow for the various levels of budgeting. Different assemblies were offered for houses in several different price ranges: $15,000 and above, $8,000 to $15,000, and less than $8,000. Sakier designed the kitchen system to be highly functional, while also promoting modern hygiene and efficiency.

39 For more information on the exhibit, see *Machine Art: March 6 to April 30, 1934, Museum of Modern Art, New York* (New York: Museum of Modern Art, 1969).

40 Nelson, "Both Fish and Fowl," 98.

41 Cheney, *Art and the machine,* 79.

42 Alexander Kira, *The Bathroom* (Viking Press, 1976), 9.

43 This description is paraphrased from "Technical News and Research: Integrated Kitchens," *Architectural Record* (October 1936).

In 1936, he wrote an article for *House and Garden* intended to appeal to female consumers, who were the primary market for such fixtures. He equated the chore of cooking with a type of artistry and invited his female readers to "imagine a breadboard that lets down at the touch of a finger," or "a 'kitchen dashboard' with sockets and switches for electric appliances."[44] There was a designated area for a paper towel roll right next to the sink faucets, "where, of course, it should be."[45] If his prefabricated bathroom panels were "machines for cleanliness," then his kitchen systems were machines for cooking, cleaning, storing, and household management. Sakier was able to successfully combine modern modes of design and assembly with the traditional methods of household engineering promoted a decade earlier by Christine Frederick, who argued that each aspect of the kitchen should be composed to minimize labor and maximize comfort and ease of use.[46]

A Modest Legacy of Modernism
With each of these designs, Sakier sought to inject the new ideals of modernism into the accessories of domestic life. As an artist, his work for American Radiator seemed an odd fit—even to him—although ultimately he found it a satisfying situation: "At dinner," he once wrote, "when my partner feels it is about time to ask what I do, I generally, albeit I have more romantic wares to offer, answer that I design bathtubs. The response is electric, earnest, and most gratifying. I am now sure of her complete attention for at least three courses… I become a social asset."[47] Although painting remained his passion, Sakier relished the notion that his designs had spread so broadly across the country, imparting his ideals of functionality and efficiency into innumerable homes.

44 George Sakier, "Her Kitchen," *House and Garden* 70 (October 1936), 142.

45 Ibid.

46 Christine Frederick, *Household Engineering: Scientific Management in the Home* (American School of Home Economics, 1920).

47 George Sakier, "Hot and Cold," photocopy of undated article in George Sakier Foundation archives. Quoted in Piña, *Fostoria.*

Indigenous Hats and Headdresses in the Andes
Edmundo Morales

A hat is a piece of clothing that humans use to cover their heads. It usually has a distinctive crown and brim, and besides its practical, functional use, it is a symbol of position, office, class, and regional identity. In the Andes, before the Spanish conquest, natives wore distinctive headdresses as markers of regional and ethnic identity.

As the Inca Empire became a Spanish colony, Indians were treated as property that came attached to tracts of land. Spanish landowners may have designed some kind of distinctive hat to mark their subjects in order to differentiate them from Indians of neighboring properties. This practice has remained in remote rural populations as markers of regional identity. For instance, natives such as the *Tarabucos* in Bolivia still design their hats with a singular flair. Married women's hats resemble the three-pointed *montera* that Spanish matadors wore in the 19th century. Unmarried men and women wear hats similar to those Spanish soldiers wore during the war of independence, consisting of a narrow cylindrical fabric with figures of birds, flowers, and bead designs.

These hats resemble a marching band hat but they have a flap that rests on the nape, symbolizing "immaturity or not fully developed" (*hoccoyllo*, tadpole in Quechua). The helmet-like heavy leather adult men's hat seems to be a copy of a Spanish helmet, but folk stories suggest different inspirations. In *Tarabuco*, there is a mountain whose peak resembles the profile of a man. Indigenous people believe that the spirits of men who died in the war of independence turned this mountain into its present form. One version of the folk story is that the adult men's hat was designed after this profile. The other version is that it was an imitation of the Spanish helmet. The more credible version is that it was designed during the war as a reminder of how merciless the Indians were against the Spanish soldiers, *Tarabuco* indigenous people are proud to be dubbed *"sonqo micos"* (heart eaters in Quechua).

In the Andes, the hat is a conduit of social and cultural reproduction in that it transmits tradition, knowledge, and values and beliefs. It means to be indigenous, illiterate and monolingual, and distant from the mainstream culture. Unfortunately, the market economy, globalization, and the popularity of wearing the ubiquitous baseball hat are threatening to extinguish the artful designs of identity.

Figure 1 a and b
Men's and women's hat, Cañar, Ecuador. The
Cañar people were one of several tribes that
put fierce resistance against the Incas, and
fought alongside the Spaniards against them.
The hat they wore up until the late sixties
had a short brim.

Figure 2 a and b
Men's hat, Willoc, Cuzco, Peru. Willoc is one
of ten communities that, before land reform
in 1969, was a private landholding. Today, the
about 800 families are subsistence farmers.
Most men and boys earn cash working as
porters on the Inca Trail.

Men's hat, Tarabuco, Chuquisaca, Bolivia.
Married men wear a hat that is made of thick
leather with small tassels on the front edge.
Upon the death of the husband, the widow
discards her hat and wears the late husband's
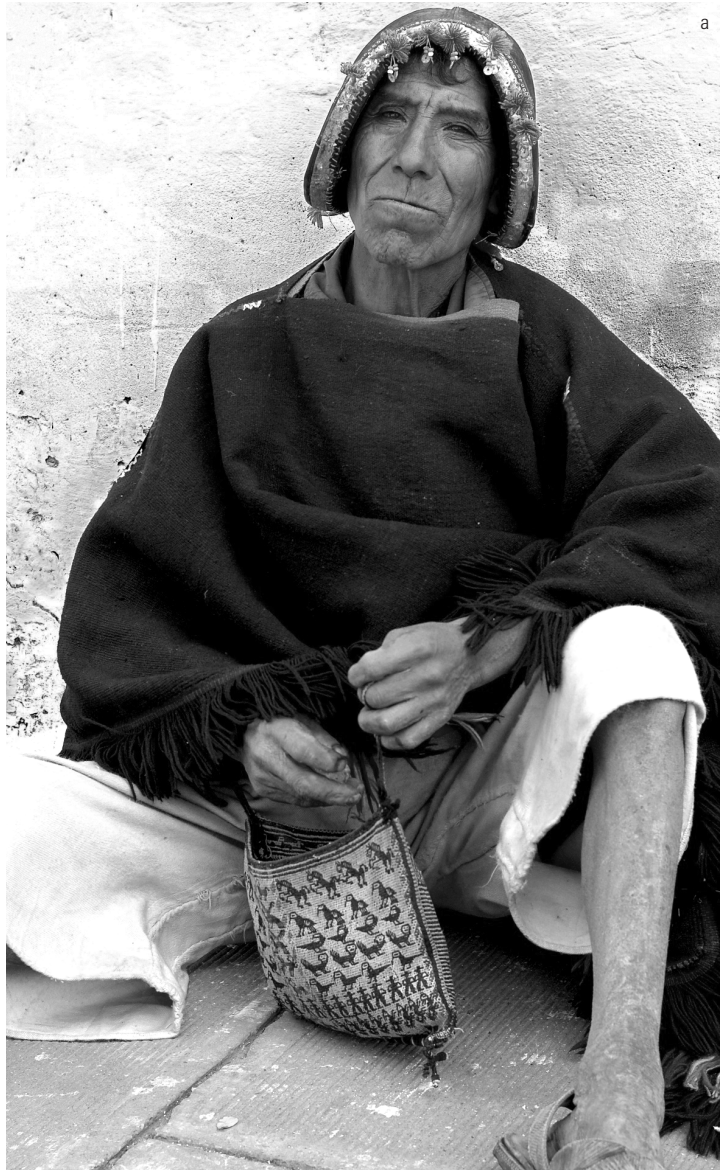hat for the rest of her life.

Figure 4 a and b
Married women's hat, Tarabuco, Chuquisaca, Bolivia. A few old women wear their original hats to Sunday fairs or special occasions. Older version hats had a heavy leather frame, rarely found today. New version hats, found only at costume stores, have cardboard frames.
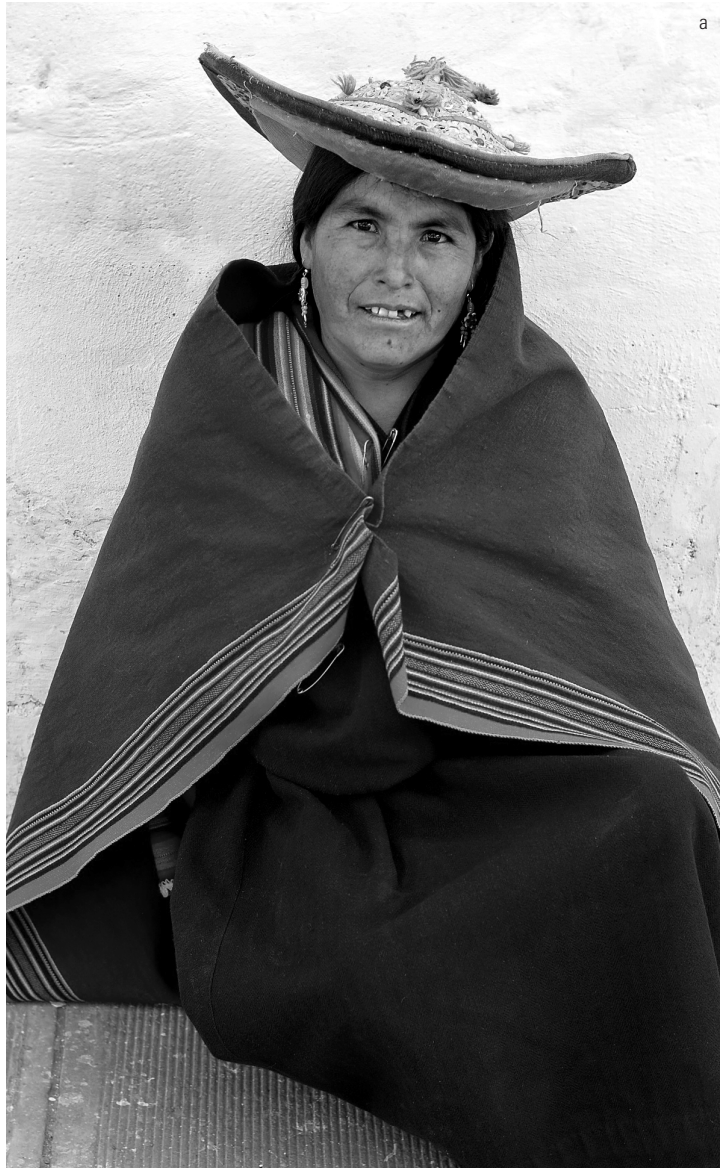
Figure 5 a and b
Single men's and single women's hat,
Tarabuco, Chuquisaca, Bolivia. This hat is
called hoccoyllo (tadpole in Quechua). It
symbolizes not being developed to an
independent, responsible person. Not long
ago, for young girls, wearing the hoccoyllo
was a symbol of virginity.