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The "I Designed It Myself" Effect in Mass Customization

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Many companies offer websites that enable customers to design their own individual products, which the manufacturer can then produce to order. To date, the economic value of products self-designed using mass customization (MC) toolkits has been attributed to the two factors of preference fit achieved (which should be as high as possible) and design effort (which should be as low as possible). On the basis of literature on behavioral decision making, we suggest a third factor, namely the awareness of being the creator of the product design. In the course of five different studies, we provide experimental evidence that this "I designed it myself" effect creates economic value for the customer. Regardless of the two other factors, self-designed products generate a significantly higher willingness to pay. This effect is mediated by feelings of accomplishment and moderated by the outcome of the process as well as the individual's perceived contribution to the self-design process. These findings have important implications for MC companies: It is not enough merely to design MC toolkits in such a way that preference fit is maximized and design effort is minimized. To capture the full value of MC, toolkits should also elicit "I designed it myself" feelings.

Key words: mass customization; toolkits for user innovation and design; self-design; user design; do it yourself; endowment effect; willingness to pay; psychological ownership
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1. Introduction

Many amateur painters hang their pictures on their walls, even though the artistic value of such works may be questionable in the eyes of others. If one were to ask them if they would be willing to sell the paintings, they would decline or demand exorbitant sums. But if offered another, similar-looking picture created by another amateur painter, they would hardly be inclined to buy it or would offer only a very small sum. This is remarkable if the two products are not different because the utility of the process (assuming that the activity of painting per se generates subjective value) can be considered sunk. But assigning a high subjective value to one's own creations is not a rare case, and it holds for many self-design activities such as pottering, cooking, knitting, building model airplanes, etc. For example, Norton (2009) reports results from ongoing research, where he and his colleagues Ariely and Mochon find that self-folded, amateurish origami are indeed valued by their originators as highly as origami made by experts if the labor is considered fruitful. As Ulrich (2009, p. 10) puts it, "A (...) driver of user design is the utility (...) users derive from solving their own problems (...) ('I designed it myself!'). A user may be willing to accept a lower-quality outcome even at the same cost of expert design." We define the "I designed it myself" effect as the value increment a subject ascribes to a self-designed object, arising purely from the fact that she feels like the originator of that object.

This phenomenon may be understood in light of behavioral decision-making literature that focuses on the many potential biases, heuristics, and other bounds of rationality impacting actual human decision making in general (e.g., Camerer et al. 2003, Kahnemann and Tversky 2000, Thaler 2000) as well as many managerial and operations management decisions in particular (Bendoly et al. 2006, Loch and Wu 2007, Gino and Pisano 2008). This line of research generally maintains that psychological factors play a crucial role and subjective attributions sometimes matter more than objective facts. Research on the endowment

effect, for example, suggests that the subjective value a person attributes to an object is contingent upon whether she owns the object or not: Goods that are included in one's endowment are valued more highly than identical goods not held in one's endowment (Thaler 1980; Kahneman et al. 1990, 1991). The endowment effect does not rely on legal ownership but is the result of subjective feelings of ownership (Reb and Connolly 2007), which can vary in intensity. The reason for an endowment-like effect in the case of the painter may be that the person associates feelings of accomplishment with the object that arise from the process of successfully creating it. Simply buying a picture might lead to a far lower degree of psychological ownership (Pierce et al. 2003).

The advent of the Internet may well have augmented the practical importance of such "I designed it myself" effects. Many companies have started to commercialize user design by offering websites that enable customers to design their own individual T-shirts, watches, kitchens, PCs, or sneakers online, which the manufacturer can then produce to order (Dellaert and Stremersch 2005, Franke and Piller 2004, Randall et al. 2005, Ulrich 2009). This interface between manufacturers and customers is known as a mass customization (MC) toolkit, configurator, choice menu, design kit, or toolkit for user innovation and design (Dahan and Hauser 2002, Dellaert and Stremersch 2005, Liechty et al. 2001, Randall et al. 2005, Thomke and von Hippel 2002, Ulrich 2009, von Hippel 2001, von Hippel and Katz 2002). These MC toolkits (as we refer to them throughout this article) dramatically reduce the level of skill necessary to design a product oneself, as easy-to-use design tools are provided and the intricate process of physical production is left to the manufacturer. Thus, we can argue on the one hand that "I designed it myself" effects have the potential to become a mass phenomenon.

On the other hand, however, we can also question the existence of such a value-generating mechanism in "virtual" online design activities with an MC toolkit. In contrast to physical activities like a painter creating a picture, a customer building an IKEA bookshelf, a scholar writing a book, an entrepreneur establishing an organization, or a politician creating a bill (examples taken from Pierce et al. 2003 and Norton 2009), designing a product online merely by clicking a mouse is not "tangible" (Peck and Shu 2009). The MC toolkit provides the user with only simulated feedback on screen, and the design process might be so easy that even a novice designer only needs a few minutes' time to create a product she thinks might fit her preferences (Franke and Piller 2004, Randall et al. 2007). Is this limited role of the originator enough to elicit feelings of accomplishment that may translate into enhanced subjective ownership and thus also into an economically relevant effect?

The extant literature on MC toolkits seems to dispute this idea. Thus far, research into the reasons why products self-designed with MC toolkits may deliver value to customers and command a price premium has clearly emphasized the increased preference fit of the resulting product, that is, the customer's assessment of the extent to which the product's features correspond to her preference system (Dellaert and Stremersch 2005, Franke and Piller 2004, Ghosh et al. 2006, Pine 1999, Randall et al. 2007, von Hippel 2001). The process experience of self-designing the product and the effort involved have been portrayed as a disutility impacting the customer's willingness to use an MC toolkit and the likelihood of abandoning the customization process without actually buying the product (Bendapudi and Leone 2003, Dellaert and Stemersch 2005, Huffman and Kahn 1998, von Hippel 2001). Value-generating psychological responses evoked by self-designing a product to the value customers attach to the result have been neglected, although a number of scholars acknowledge that the process of using an MC toolkit might give rise to positive emotions. Huffman and Kahn (1998), for example, suggest that "some consumers may find learning their preferences about a product to be fun" (p. 509), and Dellaert and Stremersch (2005) presume that consumers might "enjoy mass customizing a product" (p. 226).

Only recently, Moreau and Herd (2009) found that consumers' social comparisons to the designer of comparable "off-the shelf" products influence the evaluations of their own self-designed creations, yielding support for our basic premise that psychological factors play a major role in the value customers derive from MC. There is interesting ongoing research emphasizing the potential importance of the "I designed it myself" effect in MC. In an unpublished working paper, Deng and Hutchinson (2009) conclude from patterns in subjects' ability to recognize their self-created designs when shipped that—in addition to preference fit—perceived authorship and positive effects arising from the design phase also impact the value they derive from self-design. Their interpretations call for experimental studies in which the "I designed it myself" effect is disentangled and directly measured.

In sum, parallel research (Norton 2009, Moreau and Herd 2009, Deng and Hutchinson 2009) suggests that beyond preference fit and effort, there might be a third value-generating effect in MC that arises merely from the fact that the customer is the designer of the product. We extend this line of research (1) by providing a clean test for the "I designed it myself" effect in MC in which we keep preference fit constant; (2) by

shedding light on the theoretical mechanism underlying the effect, that is, the mediator variable of feelings of accomplishment; and (3) by offering two moderators of the effect, namely the quality of the outcome and the subjective contribution to the self-design process enabled by the design freedom the toolkit allows.

The relevance of these questions is high; scholars and practitioners alike have underscored the importance of understanding the mechanisms through which MC generates value for customers (Dellaert and Stremersch 2005, Deng and Hutchinson 2009). After all, developing and implementing such a system involves costs (Piller et al. 2004), and the adoption of such a system only makes economic sense if it generates value by allowing the manufacturer to charge a price premium or to sell more units (Ansari and Mela 2003, Kramer 2007).

In the following, we first develop testable hypotheses and then report from five studies in which we tested them empirically.

2. Development of Hypotheses: Why and When Self-Design with an MC Toolkit Generates Value

2.1. The "I Designed It Myself" Effect: Does Self-Design Generate Value?

How can we understand the "I designed it myself" effect? Literature on the endowment effect offers one possible explanation: individuals who created an object interpret it more as "theirs" than individuals who merely bought it, and in turn, subjective ownership feelings increase the subjective value of the product. Although the literature on the endowment effect initially focused on factual ownership and thus essentially adopted a binary concept (i.e., either one owns an object or not; Thaler 1980; Kahneman et al. 1990, 1991), later research emphasized *psychological* ownership, the state in which individuals feel as though an object is "theirs" (Pierce et al. 2003). The stronger this feeling of psychological ownership is, the higher one's appraisal of an object's value will be (measured as willingness to pay (WTP) or to accept) (Reb and Connolly 2007). A number of researchers have focused on the factors that lead to enhanced psychological ownership. For example, Strahilevitz and Loewenstein (1998) found that feelings of ownership (and thus the endowment effect and the object's value) are stronger when the person owns the object for a longer period of time. More recently, Pierce et al. (2003) proposed a psychological model of the antecedents, experiences, and consequences of psychological ownership. They suggest investing the self in the object as one of the three "routes" to psychological ownership, in addition to controlling the object and getting to know the object intimately; they also state that "the most obvious and perhaps the most powerful means by which an individual invests himself or herself into an object *is to create it*" (p. 93, emphasis by the authors). Similarly, Belk (1988, p. 144) states that "the idea that we make things a part of self by *creating or altering* them appears to be a universal human belief" (emphasis by the authors), and Belk and Coon (1993, p. 405) hold that "*creating the object* is one of the clearest ways of incorporating it into the extended self" (emphasis by the authors). This means that as a result, the product not only has instrumental value but also (additional) psychological value for its originator (Csikszentmihalyi and Rochberg-Halton 1981, Belk 1988, Kleine and Baker 2004, Mittal 2006). However, most of the research on this effect is theoretical and supported only by anecdotal evidence. Pierce et al. (2003) therefore "acknowledge the need for empirical testing" (p. 104) of the factors leading to psychological ownership.

Performing an experimental test of this effect in the field of products self-designed with MC toolkits can be seen as a bold step because clearly the degree of self-investment in this case is relatively small compared to the very "physical" examples used in this stream of literature, such as a man building a house with his own hands. Indeed, Pierce et al. (2003) warn that "investment(s) of the self are unlikely to emerge quickly" (p. 96). Thus, if we find an effect arising from self-design in the case of subjects using an MC toolkit, we can conclude that this effect is likely to hold in general.

Despite the limited investment of energy involved, MC toolkits still facilitate the act of creating something (von Hippel 2001), and the objects endogenous to this process should at least lead to a higher degree of psychological ownership than similar off-the-shelf products, all other things being equal. Using an MC toolkit as found on the Web in various consumer product categories, customers can select colors, designs, and shapes; come up with new and creative combinations; upload text or images; and so forth. The symbolic enrichment of the product by self-designing it should thus elicit a higher value among MC customers than a similar product purchased off the shelf. Usually self-designed products are customized to one's preferences, which means that they are not similar to prefabricated products. However, we propose that self-designing results in a higher value attribution for the product even if we control for preference fit, thus postulating the existence of a *mere* "I designed it myself" effect.

Hypothesis 1 (H1). *Beyond the product's preference fit, having designed a product oneself with an MC toolkit delivers a positive value increment for the respective customer compared to purchasing a product off the shelf.*

2.2. Is the "I Designed It Myself" Effect Mediated by Feelings of Accomplishment?

In the next step, we investigate the mechanism of the main effect more closely. Why does creating an artifact prompt the customer to attribute special value to it? Drawing on Csikszentmihalyi and Rochberg-Halton (1981), Belk (1988, p. 144) explains, "[W]e invest 'psychic energy' in an object to which we have directed our efforts, time, and attention. This energy and its products are regarded as a part of self because they have grown or emerged from the self." Thus, one's own accomplishment is embodied in the object endogenous to the process. This proud feeling of accomplishment serves the need for feelings of competence and efficacy deeply embedded in human nature (Furby 1991, Williams and DeSteno 2008). We therefore propose that creating a product oneself elicits feelings of accomplishment that are then strongly associated with the product. In turn, these positive feelings result in a higher valuation of the object.

Hypothesis 2 (H2). *The effect of having designed a product oneself with an MC toolkit on the subjective value of the product is mediated by the feeling of accomplishment associated with the object.*

2.3. Is the "I Designed It Myself" Effect Moderated by the Outcome of the Process?

We cannot assume that the enhanced valuation of self-designed objects is a universal law. Rather, it will be contingent upon certain moderating factors. One potential factor is the perceived attractiveness of the object created. If the artifact fails to meet the subject's requirements and the process is perceived as unsuccessful, it is unlikely to satisfy the need for competence and efficacy (Pierce et al. 2003). The subject might feel that her investment of time and effort was not fruitful, which will negate the reasons why she should value the outcome (Norton 2009). In the extreme, these feelings may even turn to hatred, as exemplified by a painter who lacerates an unsuccessful painting in a sudden fit of anger. In such a case, the object created is more a symbol of incompetence than competence. This might be an extreme case, as normally individuals' self-protection motive will bias their perception in a self-flattering manner (Sedikides 1993). However, the effect of self-design on perceived value should be enhanced when the subjective preference fit of the product is higher than when preference fit is lower. The higher the subjective preference fit achieved, the stronger the main effect should be.

Hypothesis 3 (H3). *The effect of having designed a product oneself with an MC toolkit on the subjective value of the product is moderated by the subjective preference fit of the product.*

2.4. Is the "I Designed It Myself" Effect Moderated by the Contribution to the Process?

Assuming that the self-design process is not a blatant failure, feelings of accomplishment should intensify in line with the subject's feelings of "being the cause" (Pierce et al. 2003, p. 89). Furby (1978) argues that the more the subject is able to exercise control over the object, the more it will be experienced as part of the self. The reason is that the subject might then attribute the outcome more to her own accomplishment, thus satisfying the need for causal efficacy. The subjective assessment of the extent to which one is the cause of the resulting product is likely to be affected by the subjective contribution enabled by the MC toolkit. The design freedom offered by existing MC toolkits varies widely in this respect. Some offer only limited choices (e.g., colors for three product modules) in order not to overstrain customers (Huffman and Kahn 1998), whereas others offer a virtually infinite solution space (e.g., by allowing users to upload self-created pictures) in order to enable closer preference fit (von Hippel and Katz 2002). We argue that the main effect will become stronger in those MC toolkits that allow users to make a larger subjective contribution to the self-designed product. As the subject has a stronger sense of being the originator, she will value the resulting self-designed product more than a subject who feels that she did not contribute much to the design of the product.

Hypothesis 4 (H4). *The effect of having designed a product oneself with an MC toolkit on the subjective value of the product is moderated by the subjective contribution enabled by the MC toolkit.*

3. Study 1: Qualitative Exploration of "I Designed It Myself" Feelings in MC

3.1. Method

In Study 1, we explore on a qualitative basis whether "I designed it myself" feelings actually arise in the context of MC, whether they have a value-generating effect, and if so, how this effect can be understood. We recruited a sample of 37 business students (average age: 23.7 years; 51% females) for a "product test" study in separate rooms at the authors' university. Subjects were offered free beverages and snacks to create a natural environment that came close to the experience of sitting at their own PCs at home. Each subject was randomly assigned to one of three MC toolkits and asked to design a product virtually according to her individual preferences. These toolkits allowed them to design an individual (1) T-shirt (http://www.shirtcity.com), (2) scarf (http://www.wildemasche.de), or (3) cell

phone cover (http://www.designyourhandy.de). The T-shirt toolkit offered less design freedom than the other two toolkits (in addition to creating some very basic text elements, users could only place one of several predefined designs on the T-shirt, whereas the other toolkits allowed users to upload multiple pictures and graphics from any external source). These research objects are typical MC toolkits similar to those common on the Web. As an incentive, we offered participants the opportunity to win either their self-designed product or a comparable off-the-shelf product. This ensured that participants engaged in the self-design processes seriously, similar to the setting in reality.

In an in-depth interview approximately 30 minutes in length, each participant was then questioned as to whether she liked her self-designed product and asked to reflect on the reasons why. The interviews were recorded, transcribed, and analyzed. Two independent coders grouped motives into two categories: (1) benefits arising from "I designed it myself" feelings, that is, motives that allow us to conclude that the mere awareness of being the originator of the design created value for the subject, and (2) other benefits (the latter component in particular comprised statements related to the preference fit of the resulting design). The values for Krippendorff's alpha are 0.71 ("I designed it myself" feelings) and 0.69 (other benefits); values greater than 0.67 are generally taken as an indication of satisfactory agreement among multiple raters (Krippendorff 2004).

3.2. Findings and Discussion

Overall, inquiries as to why participants liked their self-designed products revealed that 70% of them reported motives related to feeling like the originator of the design ("I designed it myself"). Naturally, other motives also played a role (62% of the cases), with participants frequently mentioning preference fit as a reason for liking the self-designed object. This pattern is visible in all three product categories. Table 1 lists a number of illustrative statements. It is striking that these short and virtual design processes evoked such strong emotions. Many participants developed a somewhat personal relationship to the "products" although they were only visual representations of digital information and not yet physical objects. This is exemplified in statements such as "it's from me" or "it is the spirit that is incorporated in it," which we heard in many variations. Their accounts also indicated that they were proud of the accomplishment and the fact that they had "given birth" to new designs. Overall, the findings provide qualitative support for our first two hypotheses.

It also became clear that there is some form of interaction between the "I designed it myself" effect and the effect of the preference fit achieved: 38% of subjects revealed that both motives played a role for them, or they gave answers that made it difficult to disentangle these two motives, for example, when subjects stated "(I like it) because I made it myself. It pleases me more than a standard product if I made it myself" or "I am happy about it! I am happy that I did a good job, and it simply makes me proud that I designed something so beautiful," which can be interpreted as qualitative support for our moderator hypothesis (H3). Finally, H4 also gained qualitative support. The frequency of the "I designed it myself" motive is clearly lowest in the group of subjects who used the T-shirt toolkit, in which their design freedom and thus also their subjective contribution to the result is lowest. In the other two groups, this motive was indicated roughly twice as often.

In sum, this study provides initial support for our hypotheses. However, the qualitative and cross-sectional setting of the study and the small number of subjects involved warrant further experimental studies.

Table 1 Interview Excerpts from Study 1

Reasons for product value	Frequency	Examples
Being the originator ("I designed it myself")	70% (scarf 90%, T-shirt 46%, cell phone cover 79%)	"It's definitely not the same as buying a T-shirt in a shop. There is something personal about it. So it's interesting to buy this T-shirt and not a different one created by someone else, where someone else, uh, incorporates his ideas. (…). It is, it's the effort, working and thinking about what I could do, and this, uh, it is the spirit that is incorporated in it (…) I think I've developed an addiction to the T-shirt (…) because I designed it, it gained a special, a special dimension for me." "I think it's cool (…) For me, it has personal value and personal uniqueness (…) It's from me! It is, how should I say, something of my own (…)" (cell phone cover) "Well, I fiddled around … if someone else had made the exact same one (…), I would not care, but if I…" (scarf)
Other motives (especially preference fit)	62% (scarf 60%, T-shirt 70%, cell phone cover 50%)	"You can also buy a cell phone cover in a shop, but they are … well, they lack the specific …, you do not get what you want (…)" "I could design [the T-shirt] the way I want to and not the way the manufacturers want it." "The scarf looks exactly as I want."

4. Study 2: The Independent Effect of Self-Design on the Value Attributed to MC Products (the "I Designed It Myself" Effect)

4.1. Method

4.1.1. Design. In Study 2, we aim to test whether having designed a product oneself with an MC toolkit has a value-generating effect, that is, whether it leads to a higher subjective valuation of the self-designed product compared to a product obtained off the shelf (H1). The challenge was to rule out the potentially confounding influence of preference fit. To isolate the "I designed it myself" effect, we devised a one-factor between-subject experiment that ensured that the differences in subjective value attributions (measured as WTP) can only be attributed to the way the product is obtained (self-design or off-the-shelf purchase) and not to preference fit. In this setting, subjects in three experimental groups all expressed their WTP for an *objectively identical object*, namely a college T-shirt with a specific design (Design A), printed on American Apparel T-shirts by the company Customink (http://www.customink.com). On average, the preference fit was thus kept identical for the three groups. The difference between the three groups (and thus our experimental stimulus) is only the process by which they *obtained* the T-shirt. Naturally, our standardization of the outcome restricts the creativity involved in the design process and will most likely reduce the effect size. We will address that issue further below.

For Group 1, we simulated an off-the-shelf buying situation involving a standard product. This means that after inspecting the college T-shirt (Design A) on a poster, the members of Group 1 were asked to indicate their WTP for the T-shirt ("You can now bid on *this* American Apparel T-shirt; if you win it, we will arrange for production by Customink and make it available to you.").

Group 2 was instructed to use the toolkit provided by Customink to design a T-shirt with the target design (Design A). The target T-shirt design had originally been created using the Customink toolkit. Subjects had to design a total of four different text elements, upload one logo, and position each element properly on the T-shirt, which they managed in 23 minutes on average (three subjects failed to reproduce the T-shirt properly and were subsequently eliminated from further analyses). A thorough inspection of the remaining users' designs confirmed that an outsider would not see any difference compared to the target design. In this way, preference fit is held constant between this group and Group 1. Having finished, subjects were asked to submit a binding bid for their self-designed T-shirts ("You can now bid on the American Apparel T-shirt *you designed*; if you win it, we will arrange for production by Customink and make it available to you.").

If H1 is correct, we should observe a higher WTP among subjects in Group 2 than in Group 1. Unlike the others, subjects in Group 2 went through the self-design process and should thus perceive the T-shirt as an object they had created.

Beyond testing the existence of the main effect (H1), we aimed to address three alternative explanations for the potential value increment apart from being the originator of the T-shirt and the associated feeling of accomplishment (as posited in H2): (1) The subjects in Group 2 were exposed to target Design A for a longer period of time than those in Group 1, because the former were required to reproduce the design. Theoretically, this greater familiarity with the design might have induced a positive affective reaction, a phenomenon known as the *mere exposure effect* (Zajonc 1968). In the extreme, this would mean that it is not the feeling of accomplishment associated with being the originator of the product that generates additional value but only the subject's greater familiarity with the design. (2) Another alternative explanation would be that the activity of designing and the enjoyment involved have a positive effect on the subjects' general mood and therefore potentially increase their WTP (see Pham 1998 as well as Schwarz and Clore 1983 for examples of such a *mood effect*). (3) On a related note, a *"Hawthorne" effect* is also possible (Roethlisberger and Dickson 1939, Adair 1984): Subjects in Group 2 may have responded to the higher perceived implicit social cognition on the part of the researchers, who had more frequent and intense contact with them than with the subjects in Group 1.

Therefore, *Group* 3 also received Design A as a model for the self-design process using the toolkit (as in the case of Group 2), which took them 24 minutes on average (difference to Group 2 n.s.). Again, an inspection of the users' reproductions confirmed that an outsider would not see a difference compared to the target design (two subjects failed to reproduce the T-shirt properly and were subsequently eliminated from further analyses). After finishing, however, the subjects were not asked to bid on the T-shirt designs they had made themselves (like Group 2) but on a similar-looking target design as an off-the-shelf product (like Group 1; pointing to the T-shirt with Design A on a poster: "You can now bid on *this* American Apparel T-shirt; if you win it, we will arrange for production by Customink and make it available to you.").

If the enhanced value attribution is in fact caused by the alternative explanations of a mere exposure effect, a mood effect, or a Hawthorne effect, we should observe a difference in WTP between

Groups 1 and 3. Both bid on exactly the same off-the-shelf T-shirt shown on the poster, but Group 3 was exposed to the alternative factors of longer exposure time to Design A, might have been in a better mood after the design experience, and might have perceived an increased level of attention from the researchers. If there are no differences, then it appears unlikely that the alternative explanations play a major role in our setting and thus also in the comparison of Groups 1 and 2.

If H1 is correct and designing a product oneself has an effect on the value attached to the product (the "I designed it myself" effect), we should also observe a difference in WTP between Groups 2 and 3. Subjects in Group 3 did not bid on "their own" T-shirts, that is, the T-shirts where they were involved in the design process. There is no reason for them to feel like the originators of the T-shirt. However, prior to the buying process, both groups were engaged in a similar activity for a similar period of time, namely reproducing the T-shirt. Thus, the length of exposure to Design A, the mood resulting from the design activity, and the attention perceived should be identical between Groups 2 and 3. In the case of differences in WTP, they cannot be attributed to a mere exposure effect, a mood effect, or a Hawthorne effect.

4.1.2. Procedure. A total of 114 business students (average age: 22.8 years; 47.7% females) recruited from the authors' university were randomly assigned to one of three groups. As an incentive to participate, each subject received a small gift (worth 10 euros) and participated in a raffle for a ski weekend.

Each subject was seated in a separate booth, and the setting ensured that no interaction between subjects was possible during the experiment. All instructions were given verbally by the instructors, who used written checklists to keep the instructions standardized across the experiment and who had been trained in a workshop prior to the experiment. As a first task (before being exposed to their individual treatments), subjects in all three groups completed a short questionnaire that contained the control variables (1) product interest, (2) purchase intention, and (3) income. After showing subjects the college T-shirt design (Design A) on a poster (prior to treatment), we asked about (4) their average hypothetical WTP for the product category and (5) the preference fit of the T-shirt with Design A.

4.1.3. Measurement. WTP was measured by means of incentive-compatible BDM auctions (Becker et al. 1964, Nunes and Boatwright 2004, Wang et al. 2007), which have proven to be a highly reliable and valid method of measuring consumers' WTP for consumer goods (Wertenbroch and Skiera 2002). The subjects handed in their binding bids for the underlying product and then drew a card from an urn on the spot. If a subject's bid was higher than or equal to the price on the card, she was *actually required to purchase* the T-shirt at the price indicated on the card. If it was lower, she could not purchase the T-shirt. This procedure ensures theoretical incentive compatibility: prices are exogenous to the subjects' WTP (unlike in other methods such as English auctions, bidders cannot directly influence the price paid; Kagel 1995, Wertenbroch and Skiera 2002). Therefore, our dependent variable is not hypothetical but constitutes real economic behavior. To avoid anchoring distortion, subjects were *not* informed about the price range shown on the cards (Wertenbroch and Skiera 2002). The prices in the urn ranged from 7 to 25 euros, meaning that they started at a level somewhat below market prices. In twelve cases, the subject's WTP was higher than the price indicated on the card drawn. In all of those cases, the subject readily paid the price indicated on the card on the spot and indicated her name, the desired size, and the address where the T-shirt with Design A should be delivered a few weeks later. As we find that preference fit (measured before treatment) is significantly correlated with the dependent variable WTP (measured *after* treatment in the course of the BDM auctions; $r = 0.37$; $p < 0.001$), we can assume high levels of validity in our WTP measurement (this procedure is suggested by Wertenbroch and Skiera 2002).

The control variables we measured were as follows: (1) product interest ("My general interest in a college T-shirt is high"; 3-point scale: 1 = strongly disagree and 3 = strongly agree); (2) purchase intention ("It is highly probable that I will purchase a college T-shirt within the next month"; 5-point scale: 1 = strongly disagree and 5 = strongly agree); (3) income ("How high is your disposable income per month?"; 6-point scale: $1 \leq 100$ euros and $6 \geq 500$ euros); (4) their average hypothetical WTP for the product category ("How much do you usually pay for a T-shirt of comparable quality?"; amount in euros); and (5) the preference fit of the T-shirt with Design A ("I like the design of the T-shirt," "The T-shirt design comes close to my idea of a perfect design," "The design of the T-shirt looks really great"; all three items measured on 5-point scales, where 1 = strongly disagree and 5 = strongly agree; alpha = 0.87; adapted from Randall et al. 2007). Because of the random assignment of subjects to groups, there were no significant differences between them with regard to any of these control variables.

4.2. Findings and Discussion

The results support H1: Having made the product oneself using an MC toolkit increases the value attributed to the product (measured as WTP), and this effect is independent of preference fit (see Table 2).

Table 2 Value Resulting from Self-Design (Study 2 Findings)

		WTP in euros	Post hoc tests (LSD)	
	Treatment	Mean (SD)	Group 2	Group 3
Group 1 ($n = 38$)	No activity, bid on off-the-shelf T-shirt (Design A)	4.75 (3.04)	$p = 0.01$	n.s.
Group 2 ($n = 33$)	Re-design of T-shirt, bid on self-designed T-shirt (Design A)	6.85 (3.70)		$p = 0.05$
Group 3 ($n = 38$)	Re-design of T-shirt, bid on off-the-shelf T-shirt (Design A)	5.26 (3.56)		

Note. ANOVA; $F_{(2;\,108)} = 3.512$, $p < 0.05$; $\eta_p^2 = 0.06$.

If we first examine the WTP of Groups 1 and 2, we find that subjects who actively reproduced Design A (Group 2) were willing to pay significantly more for a T-shirt with that design ($M = 6.85$ euros; SD $= 3.70$) than subjects in Group 1, who submitted a bid for a T-shirt with the same design but as an off-the-shelf product ($M = 4.75$ euros; SD $= 3.04$; $p = 0.01$). Although the product designs and the information about the manufacturer are objectively identical for both groups, the difference in WTP is relatively high (over 40%).

As noted above, however, beyond having designed the T-shirt oneself, there are alternative explanations for the value increment observed. We therefore turn to Group 3. In line with our predictions, we find that subjects' WTP is not significantly different from that of subjects in Group 1 (n.s.). Moreover, we find that subjects in Group 3 who self-designed but did not bid on "their own" T-shirts were willing to pay significantly less than those in Group 2, who self-designed and bid on "their own" T-shirts ($p = 0.05$). The effects of the alternative mechanisms of mere exposure, better mood, and increased attention from the researchers can therefore be considered negligible in our setting. Overall, we have thus found clear quantitative support for H1: Creating an object oneself with an MC toolkit will prompt the creator to attribute higher value to the object endogenous to the process.

When interpreting our findings, however, it is important to bear in mind that the experimental setting used in this study has two limitations: (1) The setting limited the size of the "I designed it myself" effect. To keep preference fit constant between groups, we standardized the target design. This means that subjects did not design as freely as they would when using an MC toolkit in real life. In a recent article, Dahl and Moreau (2007) show that tasks in which the target outcome is defined (like building model airplanes or painting by numbers) evoke a significantly lower feeling of creativity than unrestricted tasks. We therefore argue that our study is conservative in nature, and the effect would be even stronger if the customer were actually the originator of the design and not merely a "reproducer." (2) The second limitation is that there is yet another alternative explanation for the observed value increment in Group 2, namely that their WTP is higher compared to Group 1 merely because of the effect of sunk costs (Thaler 1980). In contrast to Group 1, subjects in Group 2 invested both time and effort in the process. Although subjects in Group 3 were likewise involved in the design process, one might argue that sunk costs only affect the bids in Group 2 because Group 3 did not actually bid on the T-shirt they designed, but on the target design on the poster. We will address these two limitations in Study 3.

5. Study 3: Feeling of Accomplishment as a Mediator of the "I Designed It Myself" Effect

5.1. Method

5.1.1. Design and Procedure. The objective of this experiment was to test whether the effect of having designed a product oneself with an MC toolkit on the subjective value of the product is mediated by the feeling of accomplishment associated with the object (H2). We asked 116 business students (average age: 23.6 years; 54.2% females) to self-design a pair of skis or to choose one of several standard ski designs. In contrast to Study 2, we did not provide a target design for those who engaged in the self-design activity (i.e., subjects were free to design the skis according to their preferences). The subjects' behavior therefore emulates real MC customer behavior; also, the feeling of being the originator of a design can take full effect when subjects are not confined to the task of reproducing a target design. We used a different toolkit and product category to enhance generalizability.

After answering two control questions (product interest and income, measured as in Study 2; no differences between groups), participants were randomly assigned to one of the following two groups: Group 1 engaged in self-design behavior. We instructed them to create a ski design according to their own preferences. For this task, we used the toolkit offered by the ski manufacturer Edelwiser (http://www.edelwiser.com). Participants in Group 2 bought "off the shelf": We had them inspect on a prepared website 28 standard professional ski designs by the same manufacturer and choose the one they liked most. All of the standard designs used in this study are actually marketed to customers by Edelwiser. Immediately after completing the respective task, subjects handed in binding bids for the self-designed (Group 1) or chosen (Group 2) designs and then filled out a questionnaire.

The questionnaire contained items to measure the mediating variable (the feeling of accomplishment associated with the task-specific design) and the control variables, namely preference fit (which in this setting was likely to be different between the groups) and perceived process costs. We included the latter as a proxy for sunk costs. If H2 is correct, we should find that a mediator effect arising from the feeling of accomplishment explains why self-design creates value for the subjects. The inclusion of "perceived process costs" will allow us to determine whether the alternative explanation mentioned previously (sunk cost effect) is likely to account for the effects found in Study 2.

The incentives were a gift bag worth 10 euros and a raffle for 14 pairs of skis. As in Study 2, we ensured that no interaction between subjects took place during the experiment, and once again there was no time limit for completing the respective tasks. All instructions were given verbally by the instructors, who used written checklists to keep instructions standardized across the experiment.

5.1.2. Measurement. WTP was again measured using BDM auctions. The only difference from Study 2 is that we decided to have subjects bid not on the entire product but only *on the graphic design of the skis.* The subjective value therefore corresponds to the price premium they would pay for having their self-created or chosen graphic design instead of a blank white ski design. We did this because subjects might have different perceptions of the skis' technical quality (which is not affected by self-design), and these potential differences should not create noise in our measurement of the dependent variable (WTP).

We used a relatively elaborate method to rule out this effect. Prior to the bidding, we informed participants that the 14 pairs of skis to be raffled off among the participants ten days after the experiment would contain *no graphic design* from the outset, and we handed them a blank white ski from the manufacturer for physical inspection. Then we told them that they now had the opportunity to bid on their own design or the chosen graphic design. If they won the raffle, they would win one of the 14 pairs of skis. The outcome of the BDM auctions would then determine whether they would (1) get only the pair of white skis for free (if the price drawn was higher than their bid) or (2) get the pair of skis for free *and* pay the price drawn for having their own design or the chosen graphic design printed on the skis (if the price drawn was less than or equal to their bid). If they did not win the raffle, their bids would have no consequences. Interviews revealed that the subjects clearly understood this principle. As in Study 2, subjects were not informed about the price range shown on the cards to avoid anchoring distortion (Wertenbroch and Skiera 2002). The prices in the urn ranged from 20 to 120 euros. Of the 14 pairs of skis raffled off after the completion of the experiment, four pairs were delivered as blank white skis (where the winner's bid was lower than the price indicated on the card drawn). Overall, the procedure ensured that the bids only referred to the graphic design and not to the perception of the skis' technical quality.

The feeling of accomplishment associated with the self-designed or chosen skis was measured using the following three items (adapted from Louro et al. 2005): "When I look at the ski I have self-designed (Group 1; Group 2: '…I have chosen')," (1) "the feeling I have can best be described by the word 'pride' "; (2) "I feel proud of having accomplished something"; (3) "I feel proud because I did a good job" (alpha = 0.96). Preference fit was measured using the same three items as in Study 2 (alpha = 0.93). The items for perceived process costs (adapted from Dellaert and Stremersch 2005) were "The process of getting 'my' ski design was…" (1) "exhausting" and (2) "time-consuming" (alpha = 0.80). All items were measured on 7-point scales, where 1 = strongly disagree and 7 = strongly agree.

5.2. Findings and Discussion

First, descriptive findings show that subjects who designed their own skis were willing to pay significantly more for their designs (Group 1: $M = 74.42$; SD = 56.85) than subjects who were given the task of choosing one of the standard professional designs (Group 2: $M = 45.89$; SD = 43.58; $F_{(1;\,116)} = 9.153$; $p < 0.01$). This finding replicates those of Franke and Piller (2004) and Schreier (2006) and confirms the prediction from Ulrich (2009) cited in the introduction.

In line with earlier findings in MC literature, those subjects also reported significantly higher perceived preference fit (Group 1: $M = 5.45$; SD = 0.57; Group 2: $M = 4.16$; SD = 1.27; $F_{(1;\,116)} = 15.370$; $p < 0.001$). More importantly, the feeling of accomplishment associated with the underlying skis is also significantly higher for subjects in Group 1 ($M = 3.93$; SD = 1.45) versus Group 2 ($M = 1.27$; SD = 1.14; $F_{(1;\,115)} = 25.962$; $p < 0.001$; see Table 3). These findings show that subjects indeed develop a stronger sense of accomplishment with products they design themselves compared to standard products they merely choose. Finally, perceived process costs were also rated higher in the self-design versus standard scenario (Group 1: $M = 3.37$; SD = 1.61; Group 2: $M = 2.04$; SD = 1.26; $F_{(1;\,115)} = 24.367_{(1;\,115)}$; $p < 0.001$).

We test H2 using four linear models with WTP as the dependent variable (see Table 4; Baron and Kenny 1986). In Model 1, we find that self-designing a product has a positive effect on WTP ($F_{(1;\,116)} = 9.153$; $p < 0.01$). If we include the feeling of accomplishment as a covariate in Model 2, we find this variable

Table 3 Differences in WTP and Accomplishment (Study 3 Findings)

	Mean statistics ($n = 116$)			
	Group 1 self-design *M* (SD)	Group 2 off-the-shelf design *M* (SD)	*F*-value	η_p^2
WTP (euros)	74.42 (56.85)	45.89 (43.58)	9.153**	0.07
Feeling of accomplishment	3.93 (1.45)	1.27 (1.14)	25.962***	0.19
Preference fit	5.45 (0.57)	4.16 (1.27)	15.370***	0.12
Perceived process costs	3.37 (1.61)	2.04 (1.26)	24.367***	0.18

Notes. Feeling of accomplishment, preference fit, and perceived process costs are measured on 7-point scales, where 1 = very low and 7 = very high.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

to be significantly related to WTP ($F_{(1;\,116)} = 16.349$; $p < 0.001$), and at the same time we find that the treatment effect becomes insignificant ($F_{(1;\,116)} = 0.471$; n.s.). A Sobel test supports the idea that the feeling of accomplishment mediates the effect of self-design ($z = 3.822$; $p < 0.001$). The results are similar if we also include preference fit as a covariate in the model (Model 3): both accomplishment ($F_{(1;\,115)} = 13.161$; $p < 0.001$) and preference fit ($F_{(1;\,115)} = 4.225$; $p < 0.05$) are significantly related to WTP, and the treatment effect becomes insignificant ($F_{(1;\,115)} = 1.716$; n.s.). We find that both the feeling of accomplishment ($z = 9.550$; $p < 0.001$) and preference fit ($z = 6.130$; $p < 0.05$) mediate the main effect of having self-designed a product. When we run the model with perceived process costs as an additional covariate (Model 4), we find that the group effect remains insignificant ($F_{(1;\,115)} = 1.570$; n.s.), and both accomplishment ($F_{(1;\,115)} = 12.504$; $p < 0.001$) and preference fit ($F_{(1;\,115)} = 4.080$; $p < 0.05$) remain significantly related to WTP. The effect of perceived process costs on WTP, however, is not significant ($F_{(1;\,115)} = 0.032$; n.s.). Again, a Sobel test for mediation confirms these findings (accomplishment: $z = 3.419$; $p < 0.001$; preference fit: $z = 1.975$; $p < 0.05$; perceived process costs: $z = -0.182$; n.s.). Overall, we find clear support for H2, and we do not find evidence for sunk costs as a potential alternative explanation for the "I designed it myself" effect.

6. Study 4: Preference Fit as a Moderator of the "I Designed It Myself" Effect

6.1. Method

6.1.1. Design, Procedure, and Measurement. In Study 4, we test whether the effect of having designed a product oneself with an MC toolkit on the subjective value of the product is moderated by the subjective preference fit of the product (H3). We adopted a similar experimental approach to that employed in Study 2. The difference is that we manipulated not only the process of how the subjects obtained the product (self-designed T-shirt versus off-the-shelf T-shirt) but also the preference fit of the product (high versus low preference fit). This led to a 2 × 2 factorial design. In Groups 1 and 2, we simulated an off-the-shelf buying situation with a standard T-shirt. The preference fit of the T-shirt's target design for Group 1 was set to a high level ($\text{Design}_{\text{attractive}}$), whereas for Group 2 the target design was set to a low level ($\text{Design}_{\text{unattractive}}$). Groups 3 and 4, on the other hand, were instructed to reproduce T-shirts: Group 3 reproduced $\text{Design}_{\text{attractive}}$ and Group 4 reproduced $\text{Design}_{\text{unattractive}}$. A total of 129 business students (average age: 22.8 years; 45.7% females) were randomly assigned to one of the four groups. The procedures and incentives were similar to those employed in Study 2: students also received a gift worth 10 euros as an incentive for participation. They were again seated in separate booths and first answered a set of control questions (product interest, purchase intention, and income, measured as in Study 2). As expected, we found no significant differences between the groups regarding these control variables. After exposing them to the target design, we measured the subjects' hypothetical WTP for the product category and, to check

Table 4 Feeling of Accomplishment as a Mediator Variable (Study 3 Findings, Continued)

	DV: WTP in euro (ANOVA)							
	Model 1		Model 2		Model 3		Model 4	
	F	η_p^2	*F*	η_p^2	*F*	η_p^2	*F*	η_p^2
Group (self-design vs. off the shelf)	9.153**	0.07	0.471	0.004	1.716	0.015	1.570	0.01
Feeling of accomplishment			16.349***	0.13	13.161***	0.11	12.504***	0.10
Preference fit					4.225*	0.04	4.080*	0.04
Perceived process costs							0.032	0.00
R^2	0.074		0.190		0.220		0.220	

Note. $n = 116$.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

the manipulation of the T-shirt's attractiveness, the preference fit of the respective target design. We used the same items to measure preference fit as in the previous studies (5-point scale; alpha = 0.89). In a pilot study ($n = 20$) prior to Study 4, we had pretested ten different designs and depicted the most attractive one as $\text{Design}_{\text{attractive}}$ and a more mediocre one as $\text{Design}_{\text{unattractive}}$.

Groups 3 and 4 were then asked to reproduce the target designs using the toolkit provided by Customink and then stated their WTP for the T-shirt they had designed themselves. Eventually, we measured the perceived process costs (same items as in Study 3; 5-point scale; alpha = 0.70). Groups 1 and 2 stated their WTP for a T-shirt with the respective target design "off the shelf" (i.e., without engaging in a self-design process). The procedure used for the BDM auctions was identical to the one employed in Study 2. In 16 cases, the subjects' bids were higher than the price drawn and they purchased the T-shirt. As in Study 2, we ensured that an outsider would not notice any difference between the target design and the replicated designs (three subjects from Group 3 failed to reproduce the T-shirt properly and were subsequently eliminated from further analyses). If H3 is correct, we should find that the preference fit of the target design moderates the main effect of self-design on the subjective value of the product (i.e., there should be significant interaction effect).

6.2. Findings and Discussion

6.2.1. Manipulation Check. A mean comparison between preference fit ratings for $\text{Design}_{\text{attractive}}$ ($M = 2.85$; SD = 0.89) versus $\text{Design}_{\text{unattractive}}$ ($M = 2.07$; SD = 0.70; $F_{(1;\,129)} = 31.323$; $p < 0.001$) confirms that the manipulation was successful. There was no difference in the perceived process costs between the two self-design groups (high preference fit: $M = 2.56$; SD = 1.03; low preference fit: $M = 2.47$; SD = 0.72; $F_{(1;\,63)} = 0.221$; n.s.), which confirms that we only manipulated the outcome, not the process itself.

6.2.2. Findings. First, we were able to replicate the findings from Study 2 both for the high and low preference fit scenarios (see Table 5). Subjects in Group 3 (reproduction of $\text{Design}_{\text{attractive}}$) were willing to pay significantly more for the T-shirt ($M = 10.25$; SD = 6.15) than subjects in Group 1 (off-the-shelf purchase of $\text{Design}_{\text{attractive}}$) ($M = 5.35$; SD = 2.40; $F_{(1;\,59)} = 16.501$; $p < 0.001$). Similarly, the bids of subjects in Group 4 (reproduction of $\text{Design}_{\text{unattractive}}$) are also significantly higher ($M = 7.18$; SD = 3.70) than those of Group 2 (off-the-shelf purchase of $\text{Design}_{\text{unattractive}}$) ($M = 5.24$; SD = 2.94; $F_{(1;\,70)} = 5.926$; $p < 0.05$). This again provides sound support for H1.

In line with H3, we see that the difference in WTP is much larger in the high preference fit scenario (Δ WTP Group 1 versus Group 3 = 4.90) than in the low preference fit scenario (Δ WTP Group 2 versus Group 4 = 1.94), suggesting that the outcome (subjective preference fit) moderates the magnitude of the "I designed it myself" effect. We test this interaction using a linear model with the two factors "process" (self-design versus off the shelf) and "outcome" (high versus low preference fit) as well as their interaction as independent variables. First, we find that both factors are significantly related to WTP. Subjects who actively reproduced T-shirts submitted significantly higher bids for the self-designed T-shirt ($M = 8.59$; SD = 5.17) than those who submitted a bid for the respective off-the-shelf T-shirt shown on the poster ($M = 5.29$; SD = 2.68; $F_{(1;\,129)} = 23.659$; $p < 0.001$). We also find that in the scenarios where the preference fit was manipulated to a high level ($\text{Design}_{\text{attractive}}$), subjects submitted significantly higher bids ($M = 7.76$; SD = 5.22) than in the scenarios where preference fit was manipulated to a lower level ($\text{Design}_{\text{unattractive}}$ $M = 6.18$; SD = 3.44; $F_{(1;\,129)} = 5.131$; $p < 0.05$). Second, and more importantly, we find that the interaction effect is significant ($F_{(1;\,129)} = 4.446$; $p < 0.05$). This supports H3: The higher the preference fit, the greater the effect of self-design on the subjective value. Subjects who manage to design a product they really like may enjoy a greater feeling of accomplishment than those who create a product of mediocre subjective quality. However, it is worth noting that we would expect to find no value increment (or even a negative effect) if a customer completely failed to design a product that matched her preferences—like a painter who lacerates her unsuccessful painting in a sudden fit of anger.

Table 5 Positive Interaction Between Preference Fit and Self-Design Effect (Study 4 Findings)

	WTP mean (SD)	F-value with df = 1 (η_p^2)
Process		23.659*** (0.16)
Off-the-shelf design ($n = 66$)	5.29 (2.68)	
Self-design ($n = 63$)	8.59 (5.17)	
Outcome		5.131* (0.04)
$\text{Design}_{\text{attractive}}$ ($n = 59$)	7.76 (5.22)	
$\text{Design}_{\text{unattractive}}$ ($n = 70$)	6.18 (3.44)	
Process × outcome		4.446* (0.03)

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

7. Study 5: The Subjective Contribution as a Moderator of the "I Designed It Myself" Effect

7.1. Method

7.1.1. Design and Procedure. In Study 5, we test whether the effect of having designed a product oneself with an MC toolkit on the subjective value of the

product is moderated by the subjective contribution enabled by the MC toolkit (H4). We again changed the underlying product category (this time to wristwatches) to ensure more generalizable findings. We manipulated the design freedom of an MC toolkit for watch faces developed for the purposes of the study. A total of 66 business students (average age: 23.7 years; 36.9% females) participated in a between-subject experiment and were randomly assigned to two groups. Group 1 (low subjective contribution) used an MC toolkit that allowed them to design a watch face by configuring it from a set of predefined attributes. The toolkit offered six different background colors, six different face designs, six different numeral styles, and twenty different numeral colors (thus a solution space of 6*6*6*20). (Our selection of specific attributes was based on attractiveness scores obtained from 15 students in a pilot study we had conducted prior to Study 5; attractiveness was measured with the single item "I like this background color/face/numeral style/numeral color," where 1 = strongly disagree and 5 = strongly agree. The selected attributes received an average score of > 3.) We reason that merely choosing predefined attributes will evoke only a moderate feeling of contributing to the outcome. For Group 2 (high subjective contribution), we extended the design freedom of the toolkit to enhance the subjective contribution. Here, subjects received the same predefined attributes but could additionally modify the watch face freely, upload pictures, and create new designs. The solution space was thus only limited by the size and shape of the watch face. As in the previous studies, we standardized instructions using written checklists, and all students received a gift bag worth 10 euros in return for their participation. After answering two control questions (product interest and income), subjects designed their own watches. Having completed their self-design processes, subjects in both groups were asked to bid on their designs. Eventually, they completed a short questionnaire. If H4 is correct, we should find that the subjective contribution enabled by the MC toolkit has an independent effect on the subjective value of the product beyond preference fit and perceived process costs.

7.1.2. Measurement. As a manipulation check, we included the following two items to measure subjects' perceived contribution to the design (adapted from Spreitzer 1995): "I had a great deal of control over the design process" and "I had a significant influence over the outcome of the design process" (1 = strongly disagree to 7 = strongly agree; alpha = 0.74) and averaged the scores. WTP was again measured using BDM auctions (dependent variable), with prices in the urn ranging from 40 to 80 euros (again, subjects were not aware of this price range). In six cases, the subject's WTP was higher than the price indicated on the card drawn. In those cases, they purchased the watch for the price shown on the card (individual watches obtained from the production company http://www.wmctime.com). Preference fit (alpha = 0.82) and perceived process costs (alpha = 0.75; control variables) were measured on 7-point scales using the same items as those employed in the previous studies. Because of the random group assignments, we did not find significant differences between the groups regarding product interest and income (measured as in the previous studies).

7.2. Findings and Discussion

7.2.1. Manipulation Check. As expected, students who could freely design the watch face (Group 2) reported higher levels of perceived contribution ($M = 5.30$; SD = 1.15) than participants in Group 1, who only configured the watch using predefined attributes ($M = 4.04$; SD = 1.39; $F_{(1;\,66)} = 15.752$; $p < 0.001$).

7.2.2. Findings. We find that an MC toolkit that offers high design freedom generates higher WTP ($M = 30.34$; SD = 23.19) than a toolkit in which the design freedom is limited ($M = 19.21$; SD = 10.22; $F_{(1;\,66)} = 6.502$; $p < 0.05$) (Table 6). In line with the literature, the subjects in Group 2 reported higher levels of preference fit ($M = 5.49$; SD = 0.99) than those in Group 1 ($M = 4.84$; SD = 1.10; $F_{(1;\,66)} = 6.274$; $p < 0.05$) and also perceived process costs were higher among the subjects in Group 2 ($M = 2.58$; SD = 1.25) than among the subjects in Group 1 ($M = 1.82$; SD = 0.90; $F_{(1;\,66)} = 8.064$; $p < 0.01$). The WTP differences found can be attributed not only to the treatment (manipulation of design freedom) but also to the preference fit and process costs. Thus, we ran a linear

Table 6 The Effect of High vs. Low Design Freedom in Self-Design (Study 5 Findings)

	Mean statistics ($n = 66$)			
	Group 1 Self-design: Low design freedom *M* (SD)	Group 2 Self-design: High design freedom *M* (SD)	*F*-value	η_p^2
WTP (euros)	19.21 (10.22)	30.34 (23.19)	6.502*	0.09
Preference fit	4.84 (1.10)	5.49 (0.99)	6.274*	0.09
Perceived process costs	1.82 (0.90)	2.58 (1.25)	8.064**	0.11

Linear model (DV: WTP; IV: group, preference fit, and perceived process costs): group ($F = 4.969$*; $\eta_p^2 = 0.07$); preference fit ($F = 3.370$†; $\eta_p^2 = 0.05$); perceived process costs ($F = 1.572$; $\eta_p^2 = 0.03$); $R^2 = 0.164$.

Note. Preference fit and perceived process costs are measured on 7-point scales, where 1 = very low and 7 = very high.

†$p < 0.10$; *$p < 0.05$; **$p < 0.01$; $n = 66$.

model (dependent variable: WTP; independent variable: treatment) that included preference fit and perceived process costs as covariates. We find that the treatment effect remains significant ($F_{(1;\,66)} = 4.969$; $p < 0.05$) if we control for preference fit ($F_{(1;\,66)} = 3.370$; $p < 0.10$) and perceived process costs ($F_{(1;\,66)} = 1.572$; n.s.). A Sobel test confirms this pattern: Neither of the two covariates (preference fit: $z = 1.171$; n.s.; perceived process costs: $z = -1.508$; n.s.) fully mediates the observed effect. We can thus also confirm H4: The higher the subjective contribution enabled by the MC toolkit, the stronger the effect of having designed a product oneself on the subjective value of the product.

8. General Discussion

Many companies are considering shifting product design tasks to the customer by adopting MC technologies that allow customers to design products themselves (Dellaert and Stremersch 2005, Randall et al. 2007, Simonson 2005, Thomke and von Hippel 2002, von Hippel and Katz 2002). The question of which aspects determine the value customers derive from MC is therefore a highly important one. Both scholarly research and existing MC toolkits in practice implicitly build on the assumption that two factors are essential: (1) the *preference fit* achieved by self-designed products (benefits), which should be as high as possible, and (2) the *design effort* necessary (costs), which should be as low as possible (e.g., Dellaert and Stremersch 2005, Huffman and Kahn 1998, Randall et al. 2007, Zipkin 2001).

In part, these two objectives conflict with one another. To maximize preference fit, it is necessary to retrieve information on customer preferences (Franke et al. 2009). Therefore, actively involving the customer in the product definition task might be remunerative (Thomke and von Hippel 2002, von Hippel and Katz 2002). However, this requires costly time and mental energy from the customer (Dellaert and Stremersch 2005, Huffman and Kahn 1998). Extant research thus indicates that the optimal MC toolkit balances these two objectives. Recently, significant progress has been made in determining how this can be achieved (Randall et al. 2005, Ulrich 2009).

Our research suggests that *an additional third factor* must be taken into consideration in this line of research. When designing an MC toolkit that maximizes customer value, it is important to consider that the value consumers attribute to products is not only generated by the product's increased preference fit minus the effort of self-designing it. Toolkit providers should also take into account that feelings of accomplishment arising from the process of self-designing largely impact the subjective value of the product—an effect we term "I designed it myself" with reference to Ulrich (2009). In our studies, we have found clear evidence for the existence of this effect, thus confirming ongoing research reported by Norton (2009) in the field of physical design processes.This additional benefit is higher when the outcome of the process is perceived as more attractive (i.e., when preference fit is higher) and when the customer feels that she has contributed more to the result.

This newly proposed third factor, the "I designed it myself" effect, conflicts with the objective of making the self-design process as easy as possible for the customer. A customer who merely indicates her preferences, as suggested, for example, in the concept of a needs-based toolkit (Randall et al. 2007), will experience less effort and lower frictional costs but may not truly feel she is the product's "originator" because the MC toolkit has performed the design task to a large extent. Recommender systems that compare the customer's profile to certain reference characteristics, seek to predict the optimal product based on this information (Resnick and Varian 1997, Adomavicius and Tuzhilin 2005), and therefore further reduce design costs might not enable such feelings at all. When and in what situations do the reduced costs outweigh the loss of this benefit? We cannot answer this question yet, meaning that more theoretical and empirical analyses on this issue will be required.

The need to make the customer feel that she is the product's originator might also conflict with the objective of delivering high preference fit. Given further progress in recommender systems (or other means of reducing costs for the customer), a situation might arise in which a "ready-made" solution provided by the system delivers *higher* preference fit than a customer-designed product—which, on the other hand, delivers the advantage of enabling "I designed it myself" feelings. The analysis of the balance of these three objectives and the factors moderating its optimum level constitutes an important avenue for future research.

Moreover, we do not know the extent to which the feeling of having made a contribution is desirable. It appears plausible that this is not a linear function (i.e., the higher the contribution, the higher the value). Instead, we propose that this relationship might be modeled as an inverted U-shaped function with a maximum; beyond that point, higher contributions are increasingly perceived as effort, not as additional value. The actual shape of this function is also likely to be impacted by factors such as the preference fit achieved and the design effort.

Another question that remains unanswered is when and to what extent the "I designed it myself" effect reflects (or fails to reflect) the true preference function of the customers. Theoretically, it might be that the

customers' incremental WTP for self-designed products results from the deficits of human information processing and its vulnerability to biases in the situation itself. Simonson (2005) argues that customers often have no insight into their true preference function or may even have no preference function at all, thus they "construct" preferences when they have to make decisions, that is, when they have to determine the subjective value of the self-designed product. However, this spontaneous construction might be unstable or deviate from the true preference function. In such a case, the self-designed product would then not really generate value for them and might potentially lead to postpurchase dissatisfaction. On the other hand, it might be that the higher liking of self-designed entities is, in fact, part of the customer's true preference function. In this case, the customer would be content with the product she self-designed with the toolkit—like the painter mentioned in the introduction who might proudly display her self-painted picture for many years. Because of the consequences, the question of whether the "I designed it myself" effect is an "error" or a "mindful decision" is important and requires further research.

Aside from these questions, the managerial question arises as to how an MC toolkit should be designed to enhance such "I designed it myself" feelings. Our findings suggest that this can be achieved by offering a great deal of design freedom (to enable high preference fit) and a large degree of decisional control over the process (to make the self-designer feel like "the cause"). An additional factor that might support the feeling of accomplishment is the provision of immediate (positive) feedback on successful performance during the process. Such feedback can be generated automatically by the MC toolkit, as is the case in marketers' attempts to reduce postpurchase cognitive dissonance by providing information that confirms the value of the product (e.g., Donnelly and Ivancevich 1970, Milliman and Decker 1990). Other customers who are online might also provide feedback that enhances the designer's feeling of accomplishment (Jeppesen 2005, Jeppesen and Frederiksen 2006). Recent research has shown that users of MC toolkits value feedback from their peers on interim design solutions (Franke et al. 2008). Technologically, it is possible to break up the toolkit-customer dyad and complement it with user communities. Related examples can be found in the computer gaming industry, where many products contain toolkits that allow the customer to design her own characters and maps. Here, self-designs are exchanged and evaluated, obviously with positive effects on the originators (Prügl and Schreier 2006). It might also be promising to provide affirmative feedback such as labels or certificates emphasizing the user's role as creator (e.g., "original design by [your name here], 2009, all rights reserved"). However, we have no empirical information yet on the extent to which feedback information actually enhances the effects reported in this article.

To what extent can our findings be generalized? In our studies, we have focused on the stage in which the self-design process is completed. This stage is particularly important because it is the time when the order is placed (or not) and when customer WTP matters most. We found that the benefit derived from self-design exceeds its costs at this stage (because we observed a positive net effect). *During* self-design activities, however, high process costs (such as time and cognitive effort) may well cause a user to abandon the process before it is completed if these "frictional" costs exceed the expected benefits from enhanced preference fit and from the process (Hann and Terwiesch 2003). The same holds true for the customer's initial decision to use an MC toolkit, that is, the time *before* the self-design activity. In the fulfillment stage, the consumer's "utility balance" might also change. Design defects (Randall et al. 2005, 2007) might alter the consumers' retrospective perception of the product.

Like many other consumer goods, scarves, T-shirts, cell phone covers, skis, and watches are self-expressive and publicly consumed products. We do not know whether the effect found here can be generalized to utilitarian products like computers or to privately consumed products such as mattresses. The effects might be somewhat smaller in such product categories. In addition to the product category, situational and personal characteristics might also moderate the effects reported in this article. Scholars who wish to extend this line of research should analyze whether constructs such as product category involvement, a person's desire for unique products, or more generally, her level of extroversion or patterns in her self-concept and identity influence the magnitude of the effects reported in this paper.

The value consumers derive from self-design activities might also be contingent upon the level of "doing it oneself" they generally experience. Some people lack the experience of self-efficacy in their jobs because of the division of labor and repetitive tasks—issues that were already bemoaned by 19th century economists such as Marx (1932). Because some people are not in a position to realize their potential for individual initiative and creativity on the job, they attempt to make up for it in their leisure time, which explains why activities such as gardening, tinkering, pottering, repairing, etc., have enjoyed a revival and evolved from niche markets into multibillion dollar industries (e.g., Brogan and Cort 1997, Spring 1993). This is consistent with the findings of Bailyn and Lynch (1983), who conclude that engineers who cannot find the necessary stimulation and challenges to

satisfy their "puzzle orientation" at work try to find such challenges in their discretionary time. It also suggests that the effects reported in this study may vary between customer groups and societies. For example, in economies where self-sufficiency plays a more prominent role than it does in rich Western societies, the effects arising from the extended self might be far lower. However, this is speculative and clearly requires further research.

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