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How successful would a phone-pillow be: Using dual process theory to predict the success of hybrids involving dissimilar products☆

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Abstract

Drawing on dual process theory from psycholinguistics, results reveal that, in order for respondents to develop preferences for hybrids from dissimilar categories the products underlying the hybrid need to be structurally aligned based on links between individual functions, and that these links also need to be situated in concrete consumer goals (study 1). In addition, it was found that category similarity interacts with these two factors (study 2). Specifically, prompting the potential consumer to think about structural alignment and consumer goals increased the success of hybrids made up of dissimilar products, but decreased the success of hybrids involving similar products.

Keywords: Hybrid products; Convergence; Alignment; Consumption goals

Introduction

Many of the latest hybrid products (HPs), that is, conjunctions of two normally disjoint products, involve products from very dissimilar superordinate categories. In psycholinguistics, the term "hybrid" denotes a conjunctive combination of two normally disjoint concepts (Wisniewski, 1996). Conjunctive combinations take the form of "an A, which is also a B", for example, Singer-Songwriter, Pet-Bird, or Veterinary-Surgeon (e.g. Hampton, 1987, 1988). How and under what conditions do consumers develop preferences for HPs involving categories as dissimilar as toaster and radio (e.g. DeLonghi's Kenwood TT756SL 2-Slice Radio Toaster with built-in FM Radio), an HP of mobile phone and glucose level monitor (Fox News, 26.5.07), a fridge with a TV built into the door (by LG Electronics, see Rust, Thompson, & Hamilton, 2006), or even a hybrid of Nike jogging shoe and iPod mp3 player?

There have been decades of work in how consumers form overall impressions of the attractiveness of products based on brands and attributes (Johar, Maheswaran, & Peracchio, 2006 for a recent review, and Stremersch & Tellis 2002). For example, work on composite brand extension by Park, Sun, and Shocker (1996) used as stimuli brand extensions with inconsistent characteristics such as Slim Fast Chocolate Cakemix by Godiva, (Godiva is primarily associated with expensive, high-calorie boxed chocolates and Slim Fast associated with inexpensive, low-calorie diet food) (Park, Sun, and Shocker, 1996: 454). At the same time, such work has been largely based on models of impression formation where products are assessed individually, and when offered for sale jointly, they combine additively or interactively. Insights from that body of work may therefore not be directly applicable to HPs, since products that would normally be judged as complementary do not necessarily form successful hybrids. For example, if a consumer likes steak and cake it does not mean that he or she will also like a Steak-Cake.[1] Thus, our understanding of HPs is very limited at the moment.

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[1] We'd like to thank one of the reviewers for suggesting this example.

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While there has been recent work on the addition of new features to existing products (Gill, 2008; Gill & Lei, 2009; Gregan Paxton, Hoeffler, Min, 2005; Moreau, Markman, & Lehman, 2001; Thompson, Hamilton, & Rust, 2005), few authors have specifically looked into the conjunctive combination of two existing, but previously separate, products (Gill & Dube, 2007; Rajagopal & Burnkrant, forthcoming). Within that very scanty HP literature, there has been even less attention to HPs made up of dissimilar constituents. For example, drawing on the conceptual combination literature in psycholinguistics, Gill and Dube have investigated HPs involving only similar products. Their results indicate that these HPs are difficult for consumers to make sense of, and this may limit their adoption in the marketplace (Gill & Dube, 2007: 215).

The present research investigates the likely success of HPs involving dissimilar products. It draws on dual process theory in psycholinguistics (e.g. Estes, 2003; Wisniewski, 1996), and investigates specifically the role of two factors: (1) structural alignment, and (2) goal-derived categorization. The first factor refers to the presence or absence of structural alignment (Gentner, 1982; Markman & Gentner, 1993), namely prompting the respondent to look for potential links between functional commonalities that might be hidden behind the apparent dissimilarity of the two constituent products. Research in psycholinguistics has shown that people invent emergent attributes that improve the coherence between two otherwise dissimilar and perhaps even non-combinable concepts. For example, a non-aligned version of a HP combining the dissimilar products glucose level monitor and mobile phone might be one where the two products, while combined physically, do not interact on a functional level (say, a mobile phone with an integrated needle to do prick tests). By contrast, a structurally aligned version of a Glucose level monitor-Phone (e.g. the KP 8400 from LG Electronics) links the individual functionalities of a mobile phone with those of a glucose meter, which yields emergent attributes that improve the coherence of the two products. The patient places a drop of blood on a test strip and inserts it into the phone. An application calculates the blood glucose level, displays it on screen, and can even send the results via text messaging to caregivers, see http://www.diabetesincontrol.com/modules.php?name=News&file=article&sid=3787.

The second factor involves the presence or absence of a goal-derived category that provides a "common denominator". Goal-derived categories are not established in memory but are derived impromptu to achieve a current and novel goal (e.g. "healthy breakfast substitutes" connects otherwise dissimilar product categories such as yoghurt, banana, and cereal bar, Ratneshwar, Barsalou, Pechmann, & Moore, 2001). Research in psycholinguistics shows that people do not come up with goal-derived categories naturally; instead, they need to be prompted to do so (e.g. Gentner & Kurtz, 2006). In the case of HPs, prompting a goal-derived category suggests specific usage situations that can be achieved because of the links between functions in the combined product but not with either product on its own or with a non-aligned product. For example, the text messaging function in the Glucose level monitor-Phone makes it possible for patients to communicate the blood sugar results in real time but without actually having to visit a doctor. Since caregivers can then respond immediately in cases of emergency, a Glucose level monitor-Phone may be particularly useful in usage situations involving children and the elderly, two vulnerable groups that must be closely monitored and need frequent feedback on treatment options (Gibbert & Mazursky, 2007).

In summary, in the case of a HP involving two dissimilar products, prompting structural alignment will be necessary to improve coherence and create a tentative cross-product bridge, based on links between individual functions. Prompting a goal-derived category will then be necessary to situate these links in a concrete usage situation where they can help consumers achieve new goals that were not possible with either product in isolation or with a HP that is not structurally aligned. More formally, we expect that only the interaction of the two factors (structural alignment and goal-derived categorization) will boost the success of HPs made up of dissimilar products.

Conceptual framework

Structural alignment

Structural alignment is a mechanism for understanding normally disjoint concepts, according to which the commonalities and differences of two concepts are determined via the comparison of structured representations (e.g. Estes, 2003; Gentner, 1983; Markman & Gentner, 1993; Wilkenfeld & Ward, 2001). Structural alignment focuses on commonalities and differences not only as they pertain to features (e.g. the different number of wheels used by cars in contrast to motorcycles) but also as they pertain to structural relations between those features (e.g. the fact that both cars and motorcycles have wheels, see Markman & Gentner, 1993). This focus yields two kinds of differences, namely alignable differences (those that are related to the common structure, e.g. the fact that cars have four wheels whereas motorcycles have two), and non-alignable differences (those that are unrelated to the common structure, e.g. motorcycles have stands, cars do not). Since dissimilar products have more non-alignable differences than similar products, aligning dissimilar products requires more elaboration, i.e. more cognitive resources, than the process of aligning similar products (e.g. Markman & Gentner, 1993). Research further shows that people do not spontaneously align dissimilar concepts, and need prompting to do so. For example, in the conceptual combination literature, Hampton, Green, Lewis, and Estes (2004) find that conjunctions of normally disjoint concepts put respondents' cognitive resources under considerable strain. Only after prompting to "imagine the impossible", would respondents produce conjunctive combinations of normally disjoint concepts (e.g. "a piece of furniture that is also a kind of fruit").

Structural alignment can lead to a resolution of conflicts between non-alignable differences (e.g. Hampton, 1987; Markman & Gentner, 1993). Resolving these conflicts leads to an identification of emergent attributes in order to improve

coherence, and to produce successful conjunctions. Not all of these emergent attributes, however, are *a priori* positive; structural alignment is not the same as simply looking for synergies. Kunda, Miller and Claire (1990), for instance, investigated hybrids of dissimilar social categories (e.g. Harvard-educated Carpenter). They demonstrated that when two normally divergent social categories are combined, people will invent novel emergent attributes in order to "explain" the conjunction and to make the idea more coherent. For example, the Harvard-educated Carpenter in Kunda, Miller & Claire (1990) study on divergent social categories was described as either a drop-out or an idealist. The same effects were found in hybrids involving dissimilar artifact categories. Hampton (1997) asked people to imagine combinations of artifacts that were completely dissimilar (e.g. a fruit that was a kind of furniture, such as Banana-Couch). In the protocols, participants sought to improve coherence by mapping non-alignable differences from one product to the other, even if this meant reducing the overall usefulness of the hybrid. In the case of the Banana-Couch, for example, the non-alignable difference "decays" is mapped from banana to couch. The Banana-Couch doesn't last as long as a regular couch and has to be replaced regularly. As such, structural alignment of dissimilar products constitutes a process by which people try to make the inherently non-combinable concepts more coherent, despite conflicting non-alignable differences.

In summary, a manufacturer's challenge may become to structurally align the two constituents underlying a dissimilar HP. That is, the challenge becomes to search for potential commonalities and related alignable differences that may be hidden behind conflicting non-alignable differences. For example, comparing the two products jogging shoe and mp3 player would normally produce predominantly non-alignable differences, and may lead to negative attributes that stem from the conjunction of electronics and sports apparel, such as "shoes with built-in electronics cannot be put in washing machine". On the other hand, structural alignment may also point to commonalities such as "both are often used by joggers", or "both involve rhythm". These commonalities in turn may suggest that the mp3 player delivers audio (music) and visual (playlists, volume control, etc.) information to the jogger and that this information comes from the mp3 player's hard drive (and not from the shoe). Yet, the shoe also "produces" information such as miles run, the runner's speed, etc., and this information may be captured, processed electronically, and delivered to the jogger via the mp3 player (via either audio or visual channels), and even stored on the mp3 player's hard drive so that it can be shared with other users online. Thus, "generating and processing jogging-related information" becomes an alignable difference between the two products that could have commercial value (e.g. in the case of the Nike+, a hybrid product involving a Nike jogging shoe and Apple's iPod Nano).

Goal-derived categorization

Many linguists have examined the conceptual combinations that occur in natural language processing, and the consensus is that combining two concepts, apart from structural alignment, also requires a relational inference. That is, in order to understand two concepts together, one must establish a specific relation between them (e.g. Wilkenfeld & Ward, 2001; Wisniewski, 1996).

One current psycholinguistic model posits that often, inferring a specific relation between two concepts involves finding a goal-derived category (Barsalou, 1982). Importantly, that literature shows that people do not spontaneously form a goal-derived category for dissimilar concepts without prior prompting (e.g. Gentner, 1983; Gentner & Kurtz, 2006). When prompted, however, people tend to reflect about a salient goal or appropriate usage situation, where two products interrelate meaningfully. For example, in the consumer behavior literature, Ratneshwar et al. find that only after prompting will consumers construct the relation "healthy breakfast substitutes" out of products as dissimilar as yoghurt, banana and cereal bar (Ratneshwar et al., 2001).

Analogously, when seeing a hybrid composed of dissimilar products, people may be at a loss to know what the "common denominator" is, and as such may not spontaneously think what they would use it for (i.e. create the goal-derived category), unless prompted. For example, without further reflection about possible goals that can be achieved with a dissimilar HP involving a Baby pacifier-Thermometer, the product may seem odd. However, once prompted to reflect about possible situations in which this HP may be useful, consumers may infer the goal-derived category "allowing reliable measurements when taking the temperature of very small babies, who would not normally keep a regular thermometer in the mouth for long enough", and "providing constant measurement of temperature, to enable early detection of illness" (e.g. Philips' SCH530 Thermon, orthodontic pacifier with integrated digital body thermometer, see Appendix for an illustration).

In summary, the above section on structural alignment suggests that aligning two dissimilar products improves coherence and creates a tentative cross-product bridge, where conflicts between non-alignable differences are resolved. The section on goal-derived categorization then suggests that the resulting emergent attributes need to be considered in the light of specific usage situations or consumer goals, which imply a common denominator for the apparently dissimilar products. Thus, structural alignment can yield a promising HP, if accompanied by an appropriate usage goal. Operationally, we propose that it is the interaction between these two factors that provides the necessary condition for a successful hybrid.

H1. In evaluating dissimilar HPs an interaction effect is expected between structural alignment and goal-derived categorization.

Experiment 1

Method

Dissimilar HPs were the object of study. For tight control we chose to focus on two dissimilar HPs. A pre-test among a group of 30 students focusing on different possible products that can

combine with slippers identified Slippers-Massage unit as the most plausible, yet dissimilar, product.

The first, structural alignment, factor was manipulated as follows. As discussed in the section on structural alignment above, dissimilar products have a high number of non-alignable differences, and resolving them requires significant cognitive resources. Thus, only thinking very carefully and deeply (rather than at a glance, off-the-top-of-the-head, superficially) about different possible ways of combining two dissimilar products will lead to a resolution of conflicting attributes and yield emergent attributes that enhance the utility of the HP.

For instance, a, superficial, off-the-top-of-the-head way of hybridizing jogging shoe and mp3 player could be to build the mp3 player into the jogging shoe. A concrete example of such a non-aligned HP is Dadafootwear's "CodeM": a jogging shoe with an mp3 player physically built into the shoe (the shoe has a USB port to connect to the computer and batteries are recharged by connecting the shoe to the mains). Yet, such a non-aligned way of hybridizing the two products yields little, if any, resolution of conflicting attributes, and consequently few links between functions. In fact, it may reduce the overall attractiveness of the HP: consumers may not always want to wear their jogging shoes when listening to music; they may not be able to wash their shoes; and in the end, the shoe may wear out before the mp3 player does.

By contrast, Hampton (1987) and Hampton et al. (2004) suggest that further thought may lead to a solution that is structurally aligned. That solution not only resolves conflicting attributes, but should lead to links between non-alignable differences that can be leveraged for the benefit of consumers. For example, the links between functions of jogging shoe and mp3 player in the case of the Nike+ include not only using the screen/earphones of the iPod to communicate to the jogger miles run and calories burnt (thereby virtually turning the mp3 player into a personal trainer), but also the revolutionary ability to share that workout information online with other users. Since mp3 player and shoe are connected via a chip, consumers can continue to use both elements independently (e.g. when the goal is to listen to music without wearing the jogging shoe).

To operationalize this theoretical reasoning in an experimental setting, we adapted previous manipulations of structural alignment from earlier studies in psycholinguistics (Markman & Wisniewski, 1997). In these studies, participants were asked to pretend that they are playing a game in which a concept is described to them and they would be asked to provide a first, off-the-top-of-the-head "guess" as to what the concept is. In the structural alignment condition, participants would then be told that their first guess was incorrect, and would subsequently be asked to supply a second guess. The task in the structural alignment condition was to think harder about what a good second guess would be and to record that answer (Markman & Wisniewski, 1997: 57).

While in psycholinguistics, variables such as perceived market success, intention to buy, etc. of the aligned or non-aligned concept are of less interest, in the consumer behavior context of the present study, these variables are key. Asking participants to think again about a product after telling them that their first guess was wrong and then asking them to judge the product may therefore confound alignment with a number of psychological factors that could be the actual drivers of impressions (such as involvement and depth of elaboration). It may also invite a demand artifact explanation for the result (i.e., the manipulation tells subjects that their first impression was wrong, hence if the first impression was somewhat negative the new impression must be adjusted upward). As such, to make the above methodology more appropriate for the consumer behavior context, the main adaptation involved *not* negating the correctness of the first guess condition. Specifically, we differentiated between a first, off-the-top-of-the-head guess at combining the two products (indicating the no structural alignment condition) and a second, alternative guess designed to make participants think harder about just how to best combine the two products (indicating structural alignment). Accordingly, participants were asked, "How would you combine the two products?" (no structural alignment), and "Can you think of a second way to combine them?" (structural alignment).

The second factor, goal-derived categorization, was then manipulated as follows. As discussed in the section on goal-derived categorization above, when consumers see a hybrid of two dissimilar products, they do not spontaneously think of what they would use it for, but do so when prompted. Previous applications of goal-derived categorization in cognitive science and consumer behavior have shown that if asked to reflect about an appropriate usage situation, people will create the goal-derived category, that is, the schema in which the two products interrelate and combine usefully (Barsalou, 1982; Ratneshwar et al., 2001). In line with that research, and to measure the effect of goal-derived categorization, two levels were used, namely, (1) no goal-derived categorization, and (2) goal-derived categorization, where we asked participants, "In what circumstances would this combination be useful to consumers?"

The structural alignment factor was crossed with the goal-derived categorization factor. It was expected that in providing an overall evaluation of the combined dissimilar products, an interaction effect would be observed between the structural alignment and the goal-derived categorization factors.

One hundred and sixty students participated in the experiment. They were randomly assigned to the experimental cells. Participants who indicated either prior use or familiarity with such a product combination were excluded from the analysis.

A 2 (non versus usage goal elicitation) × 2 (no alignment versus alignment) between subject design was employed.

The dependent variables were intention to purchase and market success. The correlation between the two variables was high ($r = .75$, $p < .01$), and they were averaged to create an overall evaluation index.

Results

According to H1 an interaction effect was expected between structural alignment and goal-derived categorization. A between subject ANOVA was applied using the overall evaluation factor as a dependent variable and the structural alignment and goal-derived categorization as the explanatory

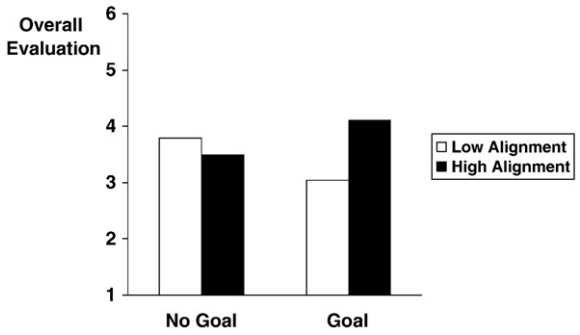

Fig. 1. Experiment 1 — The effect of goal elicitation and alignment when the product constituents are dissimilar.

variables. The outcome of the analysis is portrayed in Fig. 1. As can be seen in the figure, the highest evaluation is obtained when the structural alignment condition factor is accompanied by the goal-derived categorization factor. Statistically, it was manifested in the interaction between the two factors which was significant ($F(1,134)=5.04$, $p<.05$), supporting H1. No other effects were significant. Analysis within the two goal-derived categorization conditions indicated significant difference between the evaluations in the structural alignment condition ($F=3.80$, $p<.05$), but non significant difference under the non structural alignment condition ($F<1$).

In order to obtain a better understanding of what underlies participants' structural alignment judgments, we further conducted a qualitative analysis of the types of HP ideas formed within the structural alignment condition (namely, the cases in which participants formed both "first guess" and "second guess" ideas). This analysis provided four important insights. First, in the no structural alignment condition, participants tended to write down the potential combination with minimal effort. Typically, HP examples in the no structural alignment condition were simple physical combinations (one product built into another one). Consequently, solutions exhibited minimal indication regarding attribute conflict resolution, links between functions, and emergent attributes. To illustrate, analysis revealed that 27 (out of 40) ideas were a simple physical combination ("a massage unit inside the slippers", "slippers with a massage instrument", "massage in the slippers", and the like). Even those solutions that were more developed did not exhibit links between functions ("slippers with rollers", "slippers that spread aromatic scent", etc.). In contrast, only 9 of the ideas in the alignment condition were of this simplistic type.

Second, the differences among ideas in the alignment condition were much clearer than differences between ideas generated within the no alignment condition. Some of the ideas in the alignment condition included the following: (1) "slippers with battery charged massage instrument in which the batteries are charged by walking movements", (2) "water filled inner socks with bubbles that make one feel like in a Jacuzzi", (3) "slippers that contain a sensor which operates the massage in the slipper's sole only when the person sits", (4) "slippers with massage function that is activated upon pressing on it with the toe", (5) "slippers that warm up by movements".

Third, the alignment condition shows higher frequency of ideas that match creativity templates, compared to the no alignment condition. Creativity templates (Goldenberg, Lehmann, & Mazursky 2001; Goldenberg, Mazursky, & Solomon 1999) depict discernible, measurable and learnable patterns in novelty emergence. They are typically judged as more creative. Analysis of the ideas in the no alignment condition revealed that only 1 idea can be clearly classified as matching a template, compared with 17 ideas (e.g. ideas (1)–(5) above) within the alignment condition. It appears therefore, that effortful alignment can direct inventive thinking toward ideation that leads both to more efficient and creative solutions.

Finally, the HP ideas also indicate that the usage occasion is not the prime driver of the alignment effort. In some cases the structure did not necessarily lead to a substantially different usage occasion beyond the original, but the idea is represented in a more thoughtful way, achieving the goal more efficiently (e.g. see (1), and (2), above), while in other ideas the usage occasion actually changed from the original ("leg movements operate a cable attached massage unit for the back"). Thus, alignment effort was not interpreted by participants as being coupled with the overall goal of the product, indicating the independence of the two factors.

Experiment 2 replicated the basic design of Experiment 1 but extended that design by investigating the effect of the two factors from Experiment 1 in the case of similar versus dissimilar HPs.

Experiment 2

Experiment 1 demonstrated the interactive role of structural alignment and goal-derived categorization in boosting evaluation for dissimilar HPs. An additional objective was to investigate whether there was an interaction between the degree of similarity of the HP constituents (similar versus dissimilar, that is, from the same taxonomic category versus from a different taxonomic category) and the two factors from Experiment 1, goal-derived categorization and structural alignment. Specifically, the objective was to investigate whether the two factors would increase expected success only in the case of dissimilar HPs, but not in the case of similar HPs.

This asymmetry is suggested by the literature in structural alignment, discussed above, which shows that *similar* products share many commonalities and alignable differences, and that these are readily accessible without prompting. Further, since similar products share many features with similar functional roles, prompting structural alignment of similar products should elicit features that *compete* for the same roles given a specific consumer goal (e.g. Wilkenfeld & Ward, 2001; Estes, 2003). This dynamic can actually be observed in the marketplace. For example, structurally aligning the similar products "computer mouse" and "keyboard" may indicate many commonalities and alignable differences, such as: "both are used to enter data into computers", "both are connected to the computer either with cables or without cables", "one enters data via a stationary keyboard", and "one enters data using a

mobile unit or a trackball by moving the cursor and clicking or double clicking". As such, a structural alignment process may reveal that many of the functions in a Mouse-Keyboard HP would compete for the same roles given specific consumer goals. The "combimouse", for instance, is a HP aligning the two products "computer mouse" and "keyboard" in the following manner: an ergonomic keyboard is split in the middle, the left unit is stationary and the right unit is a mobile combination of keyboard and mouse (the keyboard itself moves around on a support surface just like a conventional mouse, featuring a contact switch; while touched, the unit is in mouse mode and some keys double as mouse-click buttons (see the Appendix for an illustration of the combimouse). In summary, the theory in psycholinguistics, as well as illustrative examples in the marketplace suggest that in similar HPs, both alignment and goal are accessible and do not require prompting. In fact, prompting alignment and goal may point to possible competition between the constituents, and detract from the overall evaluation of the similar HP.

H2. In evaluating similar HPs no interaction effect is expected between structural alignment and goal-derived categorization.

By contrast, by virtue of having many non-alignable differences, *dissimilar* products have relatively more features with dissimilar functional roles, which are not normally aligned without prompting. Further, structurally aligning dissimilar products underlying a HP may point to features that might *complement* each other in the fulfillment of a specific consumer goal (Estes, 2003; Wilkenfeld & Ward, 2001). For example, and to stay with the computer mouse as a base product, the computer mouse may be structurally aligned with a dissimilar product, the telephone. This alignment might suggest that both often lie on office desks (a commonality), that a computer mouse is used to communicate with the computer whereas a telephone is used to communicate with other people (an alignable difference), that the telephone has a keypad, whereas the computer mouse does not (a non-alignable difference), and may also suggest that the two products can be turned into a HP by creating a wireless mouse that flips open to double as a fully functional mobile phone with its own number keypad. A goal-derived categorization process may further point to emergent goals for the dissimilar HP involving computer mouse and telephone such as "substitutes the headset needed to make cheap phone calls via VoIP, useful for frequent travelers — saves them money and space in the suitcase" (e.g. Sony's Sony Vaio VN-CX1 is a computer mouse that flips open into a fully functional VoIP handset; dubbed the "ringing rodent", users are notified that a call is coming in either by a LED on top of the mouse or a ringtone, and they can then press a button on the mouse instantly turning it into a phone). Thus, hybridizing dissimilar products is unlikely to succeed without elaborative processing. Consequently, the two factors interactively boost the success evaluations of dissimilar HPs but not of similar HPs. In summary, the objective of Experiment 2 was to investigate the differential effects of the two factors (structural alignment and goal-derived categorization) in the case of similar versus dissimilar HPs.

H3. The interactive relationship between structural alignment and goal-derived categorization for dissimilar HPs and the non-interactive relationship for similar HPs lead to a three-way interaction between similarity, structural alignment, and goal-derived categorization.

Method

Based on a pre-test with the same requirements as in Experiment 1 the combination of similar HP was Calorie guide-Cookbook and of dissimilar HP was Refrigerator-Cookbook. A 2 (product similarity)×2 (goal-derived categorization)×2 (no alignment versus alignment) between subject design was employed. The manipulation of the structural alignment and goal-derived categorization factors was identical to Experiment 1. Dependent variables were intention to purchase and market success. The two questions were highly correlated ($r=.64$, $p<.001$) and were averaged to create an overall evaluation index. Participants indicating prior use or familiarity were eliminated from the analysis.

Results and discussion

As in Experiment 1, respondents were asked to describe possible HPs, although in Experiment 2 they pertained both to similar constituents and dissimilar ones. Examples of similar HPs (Calorie guide-Cookbook) included: (1) a calorie value catalog which displays a corresponding recipe for every range of calorie value; (2) a book which provides for each category, say vegetables, the calorie value of each ingredient, followed by suggested dishes that use them. Examples of dissimilar HPs (Refrigerator-Cookbook) included: (3) a refrigerator with internet operated electronic display depicting recipes that can be prepared using the ingredients contained therein; and (4) a refrigerator with a transparent drawer inside on which an open cookbook can be placed.

H2 and H3 predicted different patterns of evaluative judgments in the case of similar versus dissimilar HPs, yielding a three-way interaction between similarity, structural alignment and goal-derived categorization. Fig. 2 portrays the results of the analysis when the evaluative response served as the dependent variable. Indeed, this pattern produces a three-way interaction between product similarity, structural alignment, and goal-derived categorization ($F(1,116)=3.82$, $p<.05$), supporting H3. No other effects were significant in this analysis. Analysis conducted within the two HPs indicated that within the high similarity condition (Calorie Guide-Cookbook) the interaction between structural alignment and goal-derived categorization was not significant ($F(1,59)<1$, n.s.), as predicted in H2. The only significant main effect in this analysis was due to the alignment factor ($F(1,59)=4.37$, $p<.05$). In contrast, and replicating the test of H1 in Experiment 1, within the dissimilarity condition (Refrigerator-Cookbook) the interaction approached significance ($F(1,56)=3.24$, $p<.07$). Further analyzing the differences within the no alignment/dissimilarity condition, the difference between the two goal conditions

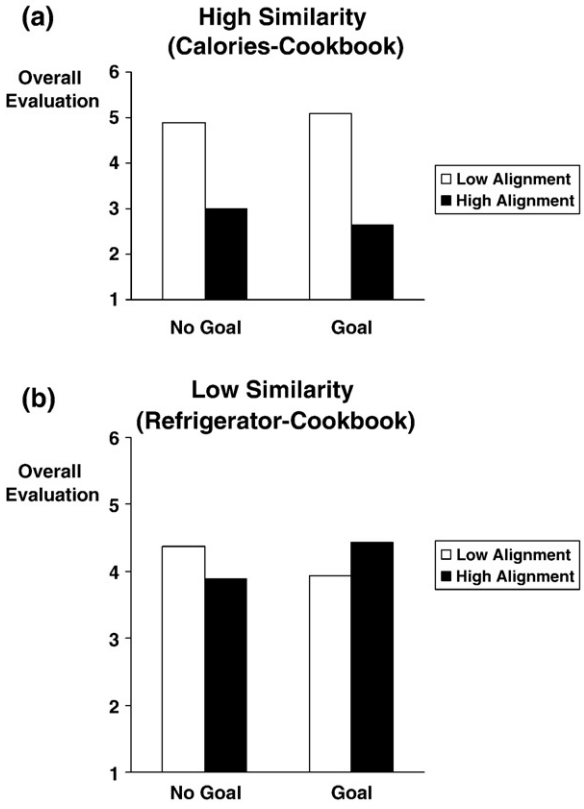

Fig. 2. Experiment 2 — The effect of goal elicitation and alignment when the product constituents are (a) similar and (b) dissimilar.

approached significance ($F=2.94$, $p<.10$). No other effects were significant in this analysis. Thus overall, the analysis suggests that consumers react differently to similar HPs and dissimilar HPs. The pattern of these judgments supports an advantage of similar HPs, except when structural alignment is joined with a usage goal, in which case dissimilar HPs appear to be advantageous.

General discussion

As mentioned in the Introduction, our understanding of HPs is very limited at the moment (Gill, 2008; Gill & Lei, 2009). Within the very scanty literature on HPs, the emphasis has been on HPs involving similar (rather than dissimilar) constituents. For example, Gill and Dube (2007) found that HPs made by combining similar constituents (i.e. products that come from the same superordinate category), are already difficult to understand and that "the cognitive demand on their comprehension may inhibit their adoption" (Gill & Dube, 2007: 215). The conceptual framework of the present research and especially the results of Experiment 2 (pointing to conditions under which non-adoption may occur) contribute to our understanding of the processes behind the non-adoption of similar HPs. Furthermore, both experiments we report in the present article contribute to the important work on HPs by beginning an examination of the processes by which consumers develop preferences for HPs made up of dissimilar constituents (which are even harder for consumers to make sense of).

In addition to this, the present article contributes to previous research on product differentiation through adding new features to existing products (e.g. Gill, 2008; Rust et al., 2006; Thompson et al., 2005). That research provided two insights. First, as technology advances, adding features becomes technically feasible, potentially enhancing a product's capability. Second, while consumers may perceive individual features as useful, too many features can also make a product overwhelming for consumers to use, leading to 'feature fatigue', thereby actually reducing a product's usability. (e.g. Rust et al., 2006; Thompson et al., 2005). The results of the two experiments in the present article suggest that the mere number of new features may not be the only factor influencing consumer perception. Specifically, our results point to three variables that may moderate the perceived capability/usability trade-off, namely consumer goals, structural alignment, and the similarity between the added feature and the base product. Results from the two experiments in this article suggest that adding similar features (as opposed to dissimilar features) may increase the effect of the capability/usability trade-off, since similar features compete (disadvantageously) for the same roles (e.g. when the same buttons are used for the music and telephone functions in a smart phone).

Limitations and outlook

In an attempt to investigate HPs involving dissimilar products, the present research employed the framework of dual process theory from the concept combination literature in cognitive science (Wisniewski, 1996). The two processes (structural alignment and goal-derived categorization) constituting this particular framework are used extensively in cognitive science to understand how people interpret different combinations of two distinct concepts, including hybrids of social categories, natural categories, and artifacts (Estes, 2003; Hampton, 1988; Hampton et al., 2004; Wisniewski, 1996). The experiments reported here replicated the main findings using two different products, thus indicating the appropriateness and generalizability of the proposed framework in the specific context of HPs. Yet, future extensions may be necessary to account for additional explanatory factors beyond those proposed in the present conceptual framework (e.g. aesthetics, frequency of use, intrinsic desirability of the products underlying the hybrid, and whether or not the products are branded, see Gill & Lei, 2009).

A second limitation is that the present research specifically defined the similarity of the products constituting the HP in taxonomic terms (e.g. Tversky, 1977). That is, two products are considered similar when they have the same superordinate category (e.g. "sofa" and "bed" form part of the superordinate category "furniture"). However, recent work in psycholinguistics suggests that there are sources of similarity other than taxonomy. In particular, it has been suggested that thematic

relations may be a different source of similarity. For example, "milk" is judged as more similar to "coffee" than to "lemonade", since there is a thematic relation between the two (some people pour milk into coffee), while "milk" and "lemonade" generally do not share such a thematic relation (e.g. Estes, 2003: 912). Research in psycholinguistics further suggests that thematically related concepts are judged as more similar than thematically unrelated concepts (e.g. Estes, 2003; Wilkenfeld & Ward, 2001). Thus, while two concepts may be dissimilar taxonomically speaking, they may still share an extant thematic relation. The research reported here held constant potential thematic relations in dissimilar HPs — and this limitation should provide interesting avenues for further research. For example, would an extant thematic relation between taxonomically dissimilar (or, indeed, taxonomically similar) products reduce or increase the effects of one or both of the two factors used in the present study (structural alignment and goal-derived categorization)? A tentative prediction would be that a thematic relation between two products in a hybrid would reduce the effect of goal-derived categorization. For example, the two products in the HP Computer mouse-Telephone share the thematic relation "using Skype", irrespective of whether the goal generation is or is not prompted.

Future research can also potentially gain from examining both the internal process and external factors from related perspectives developed in recent research. Regarding process effects, since hybrid products are presented to consumers as single units it is still unclear whether imagining the product as a composition of its constituents is sensitive to the sequence of their consideration (Biswas, Biswas, & Chatterjee, 2009), and whether individual differences may emerge because some people have a higher tendency to process holistically, while others are more analytic (Monga & Roedder, 2008). Considering external effects, since many of the hybrid products are highly novel and a large proportion are sold on internet sites, there may be age differences in terms of the segments that hybrid products are more likely to attract (Yoon, Cole, & Lee, 2009).

Appendix

The dummy/thermometer.

The Combimouse.

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