First We Throw Dust in the Air, then We Claim We Can't See: Navigating in the Creativity Storm

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It is often claimed that many of the leading successful products emerge incidentally. It is hardly possible, even in a retrospective examination, to account for such incidents by ideation methods devised to enhance randomness. The present research reviews the criticism raised in past literature claiming that the widespread randomness-enhancing methods, which advocate *unbounded* ideation, are ill defined; they do not specify the goal, the initial state, the operators, or the constraints of the ideation problem. In contrast, scant attention has been devoted, both in research and practice, to *bounded scope* ideation methods, which advocate that inventive thinking becomes more productive when the ideation process is channeled into pre-defined routes, particularly, if it follows *templates* that underlie the internal dynamics of past product-based trends. The present research exemplifies the use of templates in explaining major marketing breakthroughs, outlines the procedures for using component templates, and assesses empirically the value of this approach among practitioners in relevant ideation tasks.

Introduction

It is often claimed that the sequence of events leading to the invention of many successful leading products was merely incidental, or even accidental. Several examples of blockbuster products described in this paper, like the car Polo Harlequin, the Walkman, and Post-It, represent but a few of a long list of such unplanned inventions that turned out to be major marketing successes. Freeman and Golden (1997), who collected 200 stories of a major successes in new product history, concluded that one of three major drives for the original invention of a new product is a "brilliant stroke of genius that came by accident or by design". This phenomenon calls for research designed to examine the random nature of invention.

Since many inventions occur randomly, the key assumption underlying several of the widespread ideation methods available today is that randomness should be stimulated and enhanced in order to facilitate a better environment for productive ideation. For example, on the premise that a random piece of information is one of the best thinking stimuli, Von Oech (1983) described a set of tools devised to generate random stimuli and allow random leaps of ideation. Quinn (1985) even characterized ideation as "controlled chaos" in the innovator's mind. Referring to the use of randomness-enhancing methods, Kiely (1993) noted that more than one-fourth of all US companies employing more than 100 people offer some kind of creativity training of that kind to employees. However, although randomness in inventions has been recognized by researchers studying new product design (e.g., Ulrich, 1995; Urban and Hauser, 1993), this field has provided no research evidence that systematically assesses the efficiency of the accidental occurrence of inventions in methods of ideation.

Randomness should be stimulated

Indeed, the dilemma regarding the role of randomness in ideation is mirrored in the dichotomy observed in past ideation studies. Some advocate that the process of generating ideas is most productive in a random – "limitation free" environment, or in *unbounded* scope ideation (e.g., de Bono, 1992), whereas others assert that inventive thinking becomes more productive when the ideation process is confined and conducted within

bounded scopes (e.g., Perkins, 1981; Goldenberg, Mazursky, and Solomon, 1999a, 1999b, 1999c). Although the use of methods consistent with the former view is widespread (e.g., Rickards, 1998), scant attention has been devoted either in research or practice to methods associated with the latter view. The present paper illuminates the potential theoretical and practical implications of the bounded-scope perspective and assesses its value.

The *unbounded-scope* approach induces people to use their imagination and suspend their judgments (and criticism) until after the ideation task is completed, thereby encouraging the generation of a large number of ideas (for related concepts see "divergent thinking," Batra, Aakers and Myers, 1996 and "unstructured methods," Arnold, 1962). The process of unbounded ideation has involved methods such as brainstorming, synectics, lateral thinking, random stimulation, personal analogy, and force fit-get fired (for detailed reviews see Urban and Hauser, 1993, and Kotler, 1994). By creating an "anarchy of thought," these methods strive to simulate those accidents and create new opportunities for the mind to generate new ideas. In contrast to this view, the concept of *bounded scopes* involves thinking within a pre-defined frame of reference (e.g., morphological analysis, e.g., Urban and Hauser, 1993; note also the HIT procedure; Tauber, 1972). It is unclear from the research reported to date, however, which of the two approaches is the more promising for ideation.

Some guidance in approaching this dilemma may be drawn from the more general literature on problem solving which indicates that enhancing randomness to stimulate problem solving ability is inefficient, and often even faulty. Generally speaking, the simplest way to solve a problem is to use "brute force"; to thrash around and explore the alternative exhaustively until a solution is found. In computers, this kind of approach relies on adherence to exhaustive procedures guaranteed to yield a solution. Speed of computation is also important if the solution is to be found within an acceptable time period. There are, however, problems (e.g., "keys and boxes" puzzle, described by Boden, 1978) which, on the one hand, are solvable by a program in as few as 21 steps but, on the other, require enormous amounts of computer resources if an exhaustive search is to be conducted. By analogy, there are certain problems, many of which relate to ideation, for which reduction of the solution space to a well-defined boundary of possibilities is imperative. Such a bounded scope can be obtained only by a method that directs the problem-solving effort along relevant solution paths most likely to lead to a solution. Therefore, exhaustive search seems more appropriate when the problem solver has a clear goal, understands the initial state and constraints, and knows exactly what operators are likely to be useful.

Reitman (1964) observed that many problems resembling ideation situations are *ill defined* in that the representations of one or more of the basic components – the goal, initial state, operators and constraints – are seriously incomplete. Many ill-defined problems seem difficult, not because the solver is swamped by the task of searching through an enormous number of alternative possibilities, but because he/she has trouble thinking of even one idea worth pursuing.

Indeed, it is tempting to explore the space randomly, in the hope that, by chance, a worthy idea will surface. Simon (1979) criticized this strategy: "…In a wholly unstructured world, random search is as efficient or inefficient as any other kind. Only in a world with structure can search be selective and systematic; and only by extracting from the world information about its structure can that selectivity be implemented." This latter view was supported recently in creativity research. Finke, Ward, and Smith (1992) reported that restrictions on elements and components force one to think in more creative and less conventional ways. Imposing such restrictions, therefore, helps to stimulate creative thinking.

If correct, the implementation of this view should consist of predefining sets of constraints that will help to structure ideation and channel it, rather than to follow the theme underlying the unbounded methods of breaking rules of thought. For example, morphological analysis (e.g., Urban and Hauser, 1993; Tauber, 1972) calls for identifying the parameters of the product, listing all the possible combinations of parameters, examining the feasibility of all the alternatives, and selecting the best alternative. A different method was suggested by Altschuller (1986) who attempted to uncover hidden underlying logical patterns in the creative solutions to technological problems. By a backward analysis of problem-solution relationships, he succeeded in identifying a number of such patterns, which he labeled, "standards". These standards represent common phenomenological patterns suggesting that problem solving can be improved if such standards are considered. Recently, Goldenberg, Mazursky and Solomon (1999a, 1999c) introduced the notion of inventive templates which are the

fundamental meta-schemes underlying past new product development. In the context of a related domain (ad creativity) the superiority of templates has been shown to be robust, not even requiring human psychological intervention or input (Goldenberg, Mazursky and Solomon, 1999d).

The templates represent abstract structures that are generalizable across product categories and services. This approach integrates three major invention-enabling perspectives. The first stems from the proposition that a limited number of identified templates underlie the internal dynamics of past trends in product evolution and have the capacity to guide ideation and predict new candidate products in a wide array of related domains. The second is the "bounded-scope" principle, embodied in the template approach, which suggests that thinking should be channeled along pre-defined inventive routes. This principle is consistent with Perkins (1981) who indicated that thinking within a frame of reference requires sensitivity to the rules of the game and that, by functioning within a frame, one achieves a better position to notice or recognize the unexpected. The third perspective, which is in line with Finke, Ward, and Smith's (1992) Function-Follows-Form principle of superior creativity, is manifested in ideation in the sequence of first proposing new configurations of the product (which are template-based) and only then, considering the benefits, the aesthetic values, and other market parameters. Considered together, the template approach *transforms the ideation task from the status of ill-defined to well-defined* because it lends itself to specific definitions and to well-defined solution plans.

In their research Goldenberg, Mazursky and Solomon (1999a, 1999e) focused on a major template termed Attribute Dependency, which occurs when two previously independent product variables (e.g., price, delivery time) become related (as in the case of the Domino's Pizza discount commitment if the delivery exceeds 30 minutes). It was found that training individuals in the Attribute-Dependency template helps them to generate ideas that are judged by independent experts as superior to ideas generated by individuals who were either not trained or trained in other unbounded methods. Another example illuminating the advantage of the Attribute-Dependency template is provided by the "announcement" (not for actually launching objective but merely as an "April Fool's Day" joke) of the "Polo Harlequin" car uniquely featuring differently colored parts. Massive response by customers calling in to place orders convinced the manufacturer to go ahead and produce it although there had been no plans to introduce such a car. Its widespread success and the appearance of imitations by competitors indicate that the match between a latent consumer need and the company's sales opportunity, which in this case occurred incidentally, could have been projected by knowledge and use of the Attribute-Dependency template.

However, unlike the template tested in that study, which is *attribute-based* other templates, have been identified, although not schematically formulated and tested, that involve operation of the product *components*. Certain changes in the configuration of the product components appear to recur throughout the evolution of products. There appear to be at least three major advantages associated with the component templates that illuminate their potential as guidelines in ideation.

Identifying and defining components

First, it is far easier to identify and define components and their boundaries since in a configuration of a product, the components lend themselves naturally to identification as unique and mutually exclusive entities, relative to the frequently obscure and subjective meaning scope and boundaries of the attributes. Second, given the importance of effective dialogue between R&D and marketing personnel in the stages of ideation and screening, it is imperative that their language of interaction be common and comprehensive (Wagner and Hayashi, 1994). Hence, interacting on possible manipulations of components rather than attributes in projecting promising new ideas is more suitable in trying to achieve the company's goals. Third, ideas that emerge from singular manipulation on the components as obtained by component template training tend to be overlooked and less likely to emerge from training in unbounded methods that advocate "total freedom" ideation. This interplay between unbounded and bounded approaches is mirrored in the difference between schema-driven and data-driven processing. Several schematic theories portray people "as blithely glossing over important details, as stubbornly refusing to see the information in front of them, and as maintaining their schemas at any cost" (Fiske and Taylor, 1991, p. 98). Thus, when asked to create new ideas in "total freedom" settings, inventive thinking is more likely to focus on the relationships between the structures (as a whole) and their environmental attributes, rather than restructuring the configuration of components and their ties. In contrast, data-driven approaches postulate that people do, in fact, consider the information elements individually (e.g. Higgins and Bargh, 1987). Thus, component templates are more likely to provide a

new and important perspective for ideation, complementing the unbounded methods.

Accordingly, the present research extends the potential value of the template approach by proposing procedures for utilizing *component templates* in ideation, and examining the usefulness of the four leading templates that operate on the components of the product. Another extension involves testing the usefulness of the approach among managers in relevant ideation tasks.

Construction of Templates and their Procedures

The characteristics of a product can be divided into *components* (objects such as the wires, and electronic signals in a computer mouse) and *attributes* (variables of the product such as voltage, and the size of the shell).

The *intentional relations* between two given characteristics (either between two components or between two attributes) are defined by *links*. The set of relevant components and their designed functions (defined by links) form the *Configuration* of the product. A partial configuration of a computer mouse is presented in Figure 1. Components are denoted by circles and links by arrows. In this example, there is a link between the wire and the electronic signal which the mouse is generating: The wire enables the signal to be transferred from the mouse to the computer. Note also that the wire may also inhibit smooth movement of the mouse. However, the latter is not defined as a link because it is not an *intentional relation*. Note also that the configuration depends upon both the product structure and its usage context. In a regular context of use, the following links also exist: tracking system and the ball are responsible for producing an electronic signal that is associated with the mouse position in a two dimensional space.

In order to create a new product, the dynamics of change have to be defined as well. Templates define systematic changes between an early configuration (i.e., a previous product version) and the one that follows it (i.e., the next product version). The changes between configurations can be expressed as combinations of elementary steps, termed *operators*. The six operators are *including* and *excluding* a component, *linking* and *unlinking* two components and *splitting* and *joining* a link.

Transition from an existing product to a new idea can be accomplished by applying these fundamental operators in a defined sequence. While the template initially draws solely on product-based information, market-based information is subsequently examined to complete the formulation of the product idea. In order to illustrate the template dynamics an example the portable computer category is used below.

The Replacement Template

According to the Replacement template, an *intrinsic* component is removed from the configuration. However, the link between the removed component and the other components remains. This generates a temporarily inconsistent abstract structure. Because of the

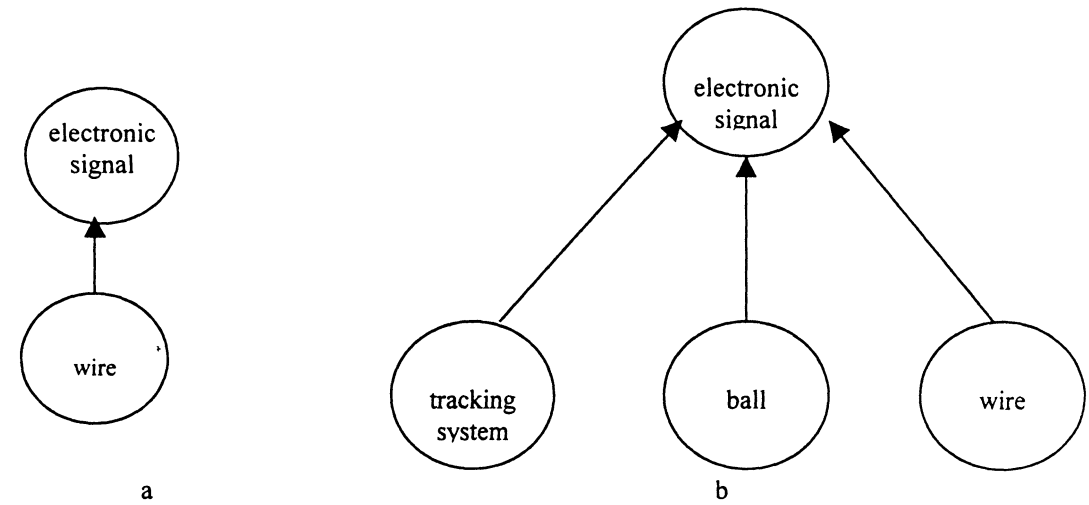


Figure 1. a) A link between a wire and a mouse signal. b) A partial configuration of a mouse.

dangling link, the operation is completed only when the missing component is replaced by another component. The replacement has to be an external component with a similar function to that of the removed component. This template (comprised of the operators sequence splitting, excluding, including, and joining) is described below and depicted in Figures 2 a–c.

1) Split and Exclude

A partial configuration of a portable computer is presented in Figure 2a. An intrinsic component is eliminated from the configuration while preserving its associated intrinsic function. In the resulting intermediate configuration, this intrinsic function is not performed by any component and it remains an unsaturated intrinsic function. The intermediate configuration is a necessary step in the replacement procedure even though it represents an incomplete product form. In this example, the battery of the computer is eliminated but its "containing charge" function remains to be performed. The resulting intermediate configuration is shown in Figure 2b.

2) Include a Suitable External Component

The unsaturated function can be fulfilled by an *external* component. As this component is out of the manufacturer's control it has to perform a similar function, or be generally similar, to the removed component. Such a component might be the user's fingers (see Figure 2-c), whose activity can provide the needed source of energy.

3) Join

By joining the incorporated component the configuration of a new product is defined (Figure 2-d). This new configuration creates a portable computer in which the keyboard charges its smaller battery. When the user clicks on the keys the energy is transformed to electrical charge.

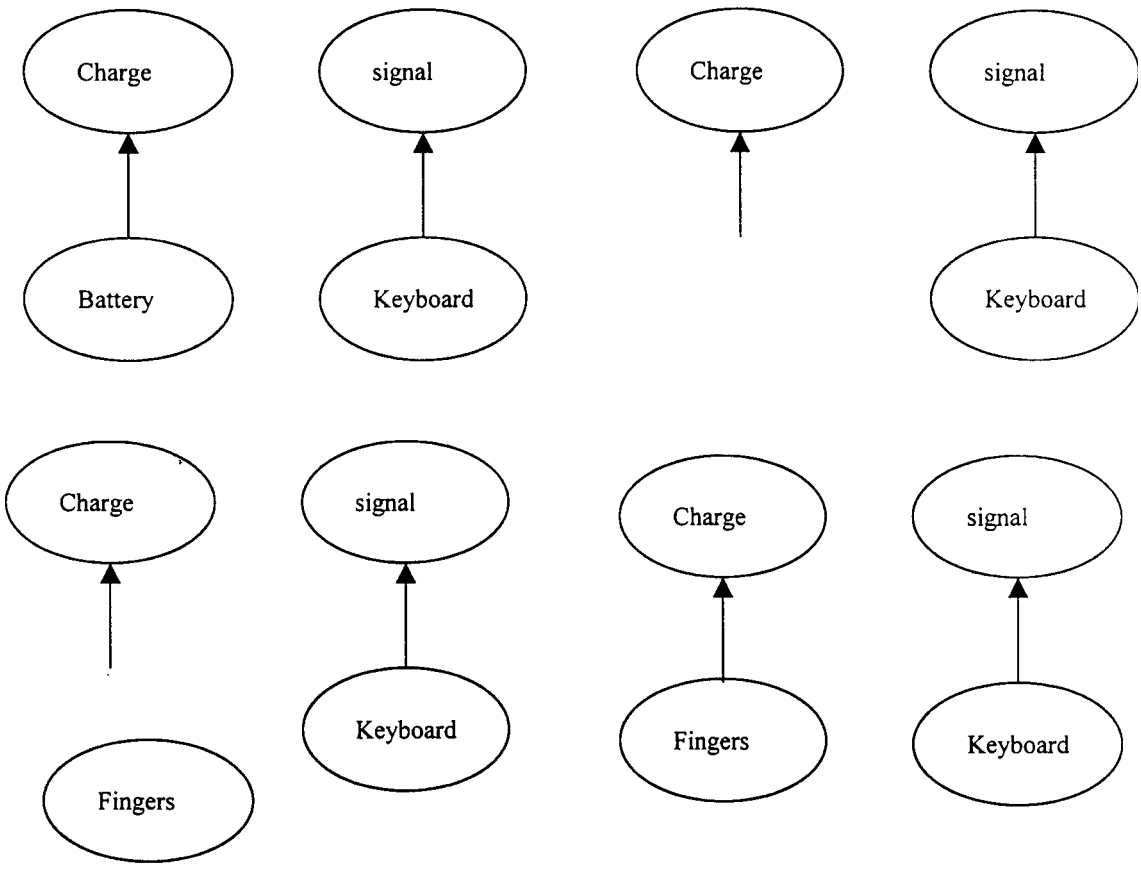


Figure 2. The Replacement Template: a) A partial (initial) configuration; b) Splitting a link and excluding the unattached components; c) Including a suitable external component; d) Joining the suitable component to form a new configuration.

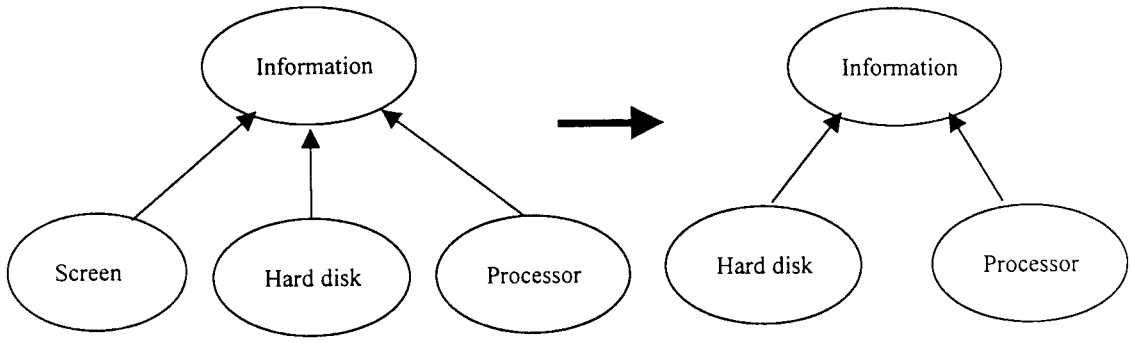


Figure 3. The Displacement Template.

The Displacement Template

Here too, an essential internal component is removed from the configuration. However, unlike the former template, its associated link is removed as well. Upon excluding this component, all the components that fulfill a function related to this component are excluded from the configuration as well. In this case, a new idea for the product has to be based on a new appeal, one that the former product did not provide.

The essential process of this template is illustrated by the portable computer configuration depicted in Figure 3. The result of excluding the screen *and* its function might be a smaller and lighter computer that is used solely for presentations.

The Component Control Template

The Component Control template involves the creation of a link between one internal component and another internal or external component.

1) List the External Components

External components, by definition, come into contact with the computer at points in time (e.g., user's fingers, eyes, table etc.).

2) Include an External Component

In our example, consider the user's eyes, which are affected by the screen radiation.

3) Link the Included Component to One of the Internal Elements or Create a Link Between Two Components that Directly Influence the Included Component.

The new link between the screen and the radiation implies that a meaningful benefit will be provided by reducing the radiation that disturbs the eyes. A new configuration illustrating this template is presented in Figure 4.

The Division Template

According to this template, a component is split into two components and each new component becomes responsible for a different function (e.g., splitting the ingredients of a strong washing powder to produce two brands, one regular and one stronger for highly soiled laundry. In the context of the portable computers category an example of this template might be a set of different mice: An internal and external one. The outcome of the division template is depicted in Figure 5.

These four component templates were found to be recurring in a series of mapping studies reported in Goldenberg, Mazursky, and Solomon (1999a) in which four product classes were examined: Soap category, hygiene products, bank accounts, and sneakers. Of the four component templates, the range of

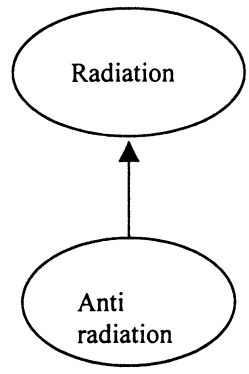


Figure 4. The component control template.

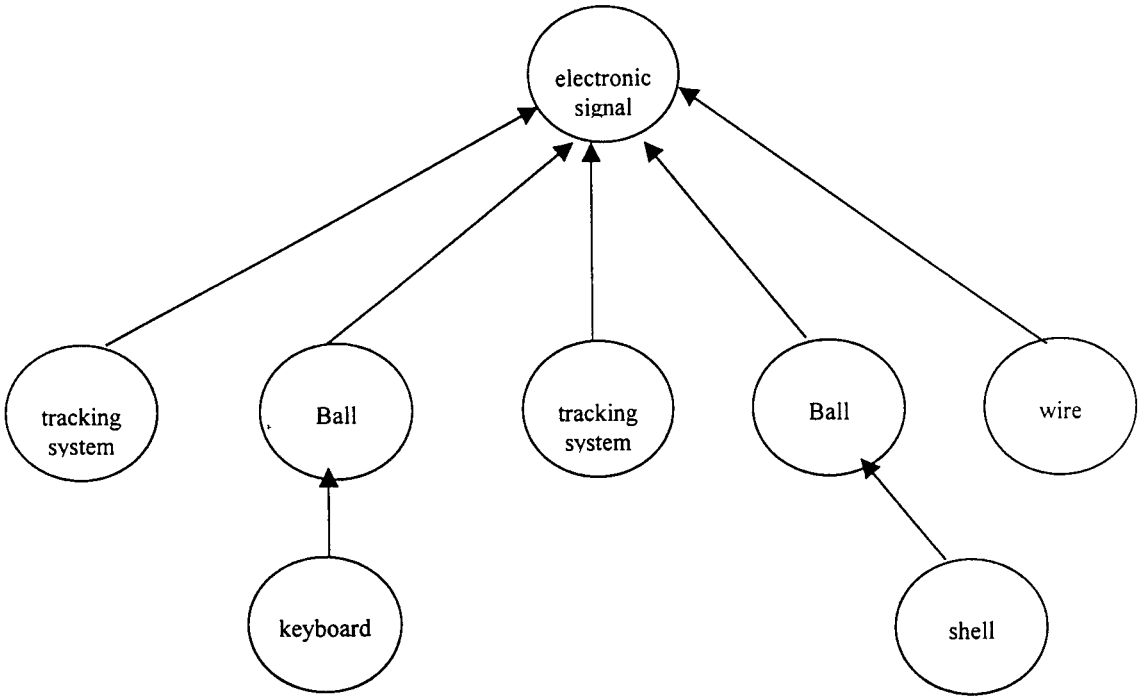


Figure 5. The division template – two mice in portable computers (the user can choose which one he wants to use).

Component Control frequency was 10–30 per cent, Replacement – (<1)–19 per cent, Displacement – 1–6 per cent, and Division – 1.5–4 per cent).

Can Templates Explain and Predict the Emergence of Blockbuster Products?

The answer to this question is: Definitely in the case of some of them, but not all of them, partly because the paradigm we present adheres to rules of parsimony and, as in the case of other comparable explanatory approaches, it does not purport to account for all random events. However, we claim that instead of competing for an exhaustive explanation rate, the relevant question is whether such new blockbuster products can be uniquely explained by applying the taxonomy of templates based on past successful product-trends.

Consider, for example, the famous 3M's "Post it" (see detailed description in Freeman and Golden, 1997) which was invented incidentally. Internal testing within the 3M organization produced extensively enthusiastic employee reactions. However, although the results obtained in test marketing conducted in four cities were acceptable, they were not outstandingly optimistic. Nevertheless, careful inspection of the data by the firm's executives indicated a high sales potential when promotion involved free sampling and demonstration. It was that combination of selling effort that elevated purchase intention scores markedly, making Post-It the most successful new product of 3M by 1984, and subsequently placing it among the top four office supply products, along with copier paper, file folders, and cellophane tapes.

For another example, consider the invention and early introduction of the "Walkman" (for a detailed description see Mingo 1994). In this case too, the invention was not initially intended. Indeed, even during the first stages following its introduction, the marketers did not envision the success potential of this product. The earlier monophonic "Pressman'' which had a recording device failed and was abandoned. Attempts to make it smaller in size failed too, because the recording system did not fit in its small size. Rather than invest any more effort, it was put aside and used by the company's engineers for their entertainment. Only after the integration of this concept and that of a light headphone, was the Walkman concept defined.

The Pressman fails

These are but two examples of a host of classic new product breakthroughs that can

be characterized by two important features; first, they match one of the templates defined and illustrated in the previous section, and second, the input of consumer needs, derived from assessment of current market trends at the invention stage, did not contribute to the accurate appraisal of the products as major long-term marketing achievements. Figure 6 provides the formal representation of examples of well-known product successes that can be depicted as extrapolation of product component templates. Note that the sequence of events underlying their development can be portrayed in a well-defined manner, and thus, although in reality, they emerged accidentally, they could have been foreseen.[1] The templates provide a "skeleton" that relies on past product-based information for new inventions; the scope of possible solutions is finite and manageable, and invariant to the random process.

Obviously, in order to create an operational agenda of stages that might replace the accidental nature of such inventions, two conditions must be met. First, the approach has to be trainable, that is, knowledge of the templates has to be assimilated by workshop participants, and applied by them in the desired context. Second, measures of creativity and performance must have the capacity to differentiate between inferior and superior ideas and allow for an early screening by experts in market knowledge. In the following, we report a preliminary study by examining the trainability of the templates, and Studies 1 and 2 which assess the value of ideas generated by applying template knowledge, by comparing them with those generated by training in rival unbounded methods.

Assessing the Advantage of the Templates

Preliminary Study

The purpose of the preliminary study was to provide a first step in assessing whether the templates are trainable as an ideation method, and whether individuals responsible for new product decisions in their company can actually generate template-based ideas following such training. A workshop was designed to train the participants to use the template taxonomy and to implement it in developing new product ideas. Five senior employees of a mid-size pharmaceutical company participated in a workshop consisting of a series of four sessions, each lasting about four hours. In that workshop the participants were trained in all five templates (including attribute dependency and the four component templates) with about equal time devoted to each template. In all cases the training and examples used were drawn from contexts and product categories different from those used in the study. Upon indication that the templates were satisfactorily comprehended and could be used in ideation, the participants were asked to generate product ideas relating to a specific type of medication. Then, the next template was presented.

In the ideation task participants were encouraged to use conventional ideation methods that involve "total freedom" idea generation, such as brainstorming, and to elicit as many different ideas as possible. All participants were previously trained in, and were familiar with, applying such conventional methods. In addition, idea generation was conducted by using the creativity template taxonomy. Although it is recognized that ideation might have been skewed toward template usage rather than reliance on conventional methods, the objective of the preliminary study was nevertheless to assess whether participants could generate a meaningful number of ideas that match the templates.

Results and Discussion

The results are presented in Table 1 (column 1). Overall, 55 ideas were obtained by the group. The template procedures yielded 34 ideas (62 per cent of the total number of ideas). Since the main task of the group was to generate ideas for new products, the obtained number of templates-based ideas implies that thinking within bounded scopes is as natural as divergent, unbounded thinking. It should be noted that for the company this workshop represented a "real-life" task: Neither the participants nor the instructor were told that the results of their work were also a part of an experiment.

Study 1

The study was a field research focusing on the effectiveness of the creativity templates. Specifically, the study was designed to examine whether the utilization of creativity templates in the ideation process leads to superior outcomes.

Procedure. Five senior employees of a credit company participated in a training workshop. The workshop consisted of a series of six sessions, each lasting about four hours. The workshop was designed to teach the participants about the template taxonomy and to

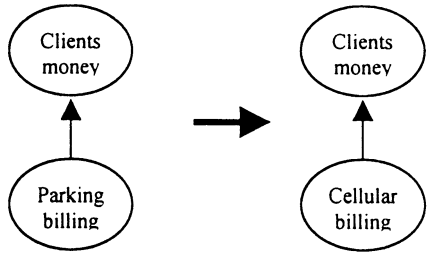
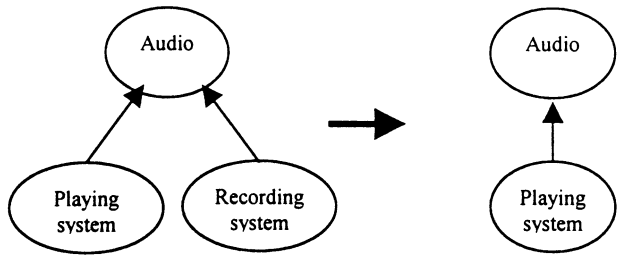
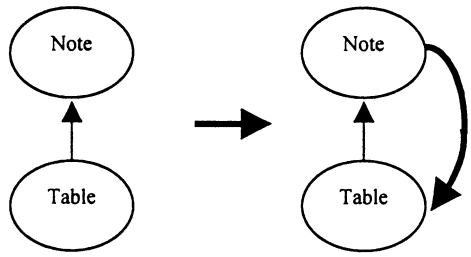
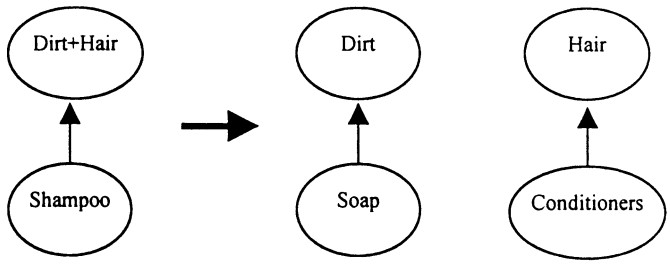
Affiliation to a template	A Known New Product Concept	
Rep	Using the cellular phone billing system instead of the service billing system (e.g., parking – the driver calls to a specified number in order to park and pays via the cellular billing system)	
Dis	Walkman (Sony) The recording system was eliminated, enabling a compact size and portability.	
CC	3M 's "Post it" notes A new link was generated between the table and the note.	
Div	The emergence of hair conditioner category From an initial integrated product that contained shampoo and conditioning ingredients, two separate products were formed, one in which the soap is linked to the dirt (shampoo), and the other, in which the conditioning ingredients are linked to the hair (conditioners)	

Figure 6. Template-based representation of several successful products.

train them to implement it in developing new product ideas.

Participants were first trained with the use of conventional ideation methods involving "total freedom" in idea generation, including brainstorming, synectics, lateral thinking, and free association. Training ceased when participants indicated comprehensibility and ability to utilize the methods in ideation. Participants were then asked to generate as many different ideas as possible. This phase yielded 14 ideas. This was followed by training in the use of templates. Subsequently, participants re-engaged in idea generation, this time, based exclusively on templates. That session yielded 30 ideas. Table 1 (column 2) displays the breakdown of ideas into template and non-template categories.

About a month after the workshop ended, all the ideas were rated for their overall quality. Eight judges performed this rating procedure – five have been the participants in the workshop and the remaining three were senior marketing professionals who had not participated in the workshop. The one-month delay in the rating procedure by one month was introduced to counter undesired effects attributable to recall of the classification of ideas as originating from either conventional methods or from creativity template procedures. The potential confounding due to self versus external rating effect was assessed by performing individual level analysis for each judge separately, as reported in the Results section below.

Results and Discussion

All eight judges were asked to rate the ideas on a five-point overall quality scale. Following an Intra-classification procedure, which yielded a reliability level of .70 (Winer, 1971, p. 283) the ratings were averaged. The analysis focused on the differences between the ideas derived from the template procedure and those generated by using conventional methods. Comparison between the ratings of the template-based ideas and those generated by using conventional methods indicated the advantage of the former over the latter methods ($F(3,40)=17.37$, $p<.0001$). Comparisons between each one of the templates individually and the conventional methods produced significant differences ($p<.001$ in all comparisons), whereas no differences were found in comparison among the templates themselves (in all comparisons $p>.10$ or above).

In order to assess potential bias originating from the fact that five of the judges had also participated in the workshop, the ratings of the participant judges was compared with those of the non-participating judges. The mean judgment of the former group was 3.13, whereas that of the latter group was 3.18, with no significant difference between the two ($t(42)<1$, n.s.). Furthermore, the ratings were analyzed individually for each of the eight judges. In all eight cases, the ratings of the creativity template-based ideas were significantly higher than the ratings of ideas generated by the conventional methods (all t's ranged between 2.09 and 4.77 and were significant at least at $p<.05$ level). Thus, the five workshop participants as well as the three non-participants rated the template-based ideas as superior.

The comparison in Study 1 was between template-based ideas and ideas generated by conventional methods. Although, for the sake of testing the effectiveness of the template method it was useful to compare it with other methods, Study 1 was confounded by the difference in the timing of the measurement

Table 1. The Distribution of Generated Ideas

Templates	Pre Study	Study 1	Study 2
Attribute Dependency	16	16	16
Component Connection	10	10	9
Replacement	6	–	3
Displacement	2	–	–
Division	–	4	3
Total	**34**	**30**	**31**
Non Templates			
Total	**20**	**14**	**28**

between "total freedom" methods and the bounded thinking approach. In Study 2 comparison between template and non-template ideas was conducted only after participants had been exposed to both the conventional and the template approach. The difference between template and non-template ideas depended on whether or not the ideas fitted the templates. It should be noted that the objective was to obtain a real life application regardless of any preference to the source of the idea, that is whether it stemmed from the template approach or from other approaches.

Study 2

Procedure. The procedure of Study 2 was essentially similar to that employed in Study 1 except for two main differences. First, the workshop took place in a bank and involved the domain of saving accounts using senior employees responsible for designing and planning of saving accounts. Second, ideas were generated upon completion of the workshop after balanced training in both "total freedom" and template-based ideation.

Overall, 59 ideas was generated; 31 ideas fitted the templates whereas 28 did not. Table 1 (column 3) displays the breakdown of ideas into the templates and non-template categories.

The ideas were subsequently presented to two banking experts who served as judges in evaluating the ideas. The judges were unfamiliar with the methods and were blind to the categorization of ideas into template-based and non template-based ideas. The ideas were rated on the same scale as in Study 1. The mean judgement obtained for template-based ideas was higher (mean=3.91) than for non template-based ideas (mean=2.85, $F(4,54)=6.24$, $p<.001$). There was no significant difference among the templates-based ideas (in all the comparisons $p>.35$ or higher). the breakdown of judgments by the individual template categories is presented in Table 2.

Conclusions

It is sometimes hard to define a clear-cut divide between the unstructured and total freedom advocates, and the focussed or structured advocates within the creativity field. Indeed in many reported cases random events helped to overcome some psychological blocks.

Bounded approaches contribute

The main conclusion from the present study is that a bounded approach, which draws on past successful templates of product development, can contribute to reduction of the reliance on randomness characterizing the invention of many new and successful products. In addition, such an approach can be utilized to ideate promising product concepts for the future. The article outlines the structure of the leading component templates by formally specifying the sequence of operators which jointly compose a set of well-defined manipulation process of product components. The operation focuses on the components that can be uniquely and comprehensively defined, and have the capacity to serve as a suitable source for a common language interaction between R&D and marketing personnel in the ideation stage.

The indication that past product-based trends may serve as a useful source for ideation should shift attention from sole reliance on unbounded ideation approaches. In addition, the templates approach may add value to the ideation methods that draw new ideas from current market needs. While responsive approaches that are based on analysis of the current market needs (obtained by the majority of the marketing research methods) are highly useful in the more advanced stages of the product life cycle, the generalization that these may be

Table 2. Mean Ratings of the Ideas

Template	Study 1		Study 2	
	Means	S.D.	Means	S.D.
Attribute Dependency	3.4600	0.5273	4.000	0.7071
Component Connection	3.6760	0.3257	3.7778	0.7949
Replacement			3.6667	1.0408
Displacement				
Division	3.1900	0.8040	4.1667	0.7638
Non-template	2.3679	0.4717	2.8571	0.8909

similarly powerful in invention and should therefore dominate the ideation process, is questionable. Reservations with regard to the use of consumer reactions in ideation have been echoed in a number of past studies (e.g., Davis, 1996). For example, Urban and Von Hippel (1988) noted that while customers may be able to express their opinion about existing products and even predict whether or not they will succeed, they may be unable to supply researchers with information about future needs and predict which products will be needed in future.

Competition, too, does not always serve as a productive source for ideation. Even if attempts to create a competitive edge require knowledge of the entire spectrum of available products as well as other previously contemplated concepts, the ability of that knowledge to improve the quality of ideation is questionable. Chan and Mauborne (1999) noted recently that the only way to avoid a war between firms is differentiation. The problem is that they do not know how. The fact that they have to be creative is known to them but "thinking out of the box" is only a general strategy. They do not know where to start and what exactly they should be doing.

The recurring templates in product-based trends serve to prescribe bounded ideation approach. Recent studies also provide justification for the use of structured – procedural approaches in that they avoid the "convenient light" syndrome (Zaltman and Higie, 1993) associated with traditional unbounded ideation methods.

In addition, reliance on random events (or luck) is both inefficient and, for the most part, unreliable. Many new products have emerged as a consequence of coincidence. However, we do not have reports on numerous other cases in which random events led to failure or to no ideas at all. The pure assumption of randomness leads to the conclusion that reliance on the occurrence of such an event is not sufficiently efficient.

Another major conclusion is that the template approach should be assessed not merely as an ideation method but in its role within the broader scope of integration between R&D and marketing activities. Product-based trends that underlie the templates represent long-term reflection of past marketing realities. The template approach projects their extension to the present marketing environment. In other words, the product ideas that are the most natural extension of past trends are offered as potential ideas for the present. The main task then, becomes examination of their appropriateness in the current market situation (which is a well-defined problem, Tauber, 1972). If the emergence of latent need to an existing need resembles an occurrence in the past, it is likely that the template-matching idea will be recognized as superior idea in the current market situation as well. This process coordinates and unifies the ideation objectives of R&D and marketing personnel via a comprehensive and common language. Indeed, this convergence represents the ultimate objective of the template approach.

It is important, in future research to address the roles of structured vs. random driven creativity and their interplay. There might be situations that one approach is superior to the other and vice versa. There is also a possibility that the two effects can be unified. For example, in a recent work, Rickards & Moger, (1999) discussed *benign structures* as ways of bounding yet liberating ideas in teams (and for individuals). It may appear that efforts to introduce randomness are not uniformly 'anti-structural' they may be versions of avoiding premature closures. IT is also important to note that if we accept the template constraining as a closure, we can still improvise on the component we remove or replace, and how we control the external component within the template boundaries. Thus a productive balance between randomness and predefined restrictions is formed.

Note

1. In order to conduct a more systematic examination of template-matching ideas underlying blockbuster products, the 50 published case histories reported in Freeman and Golden (1997), out of the 200 that were examined, were analyzed. Out of 23 cases identified as random invention 19 were found to be template-based.

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