

# Templates in Creative Sparks

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## **Abstract**

We question whether creativity requires functions exclusive to the human mind or it can rather be obtained by the mere performance of well-defined prescribed operations. The natural thinking process involves a complexity of sensory inputs, psychological factors, cognitive background, social rules and constraints which interfere (constructively and at times, destructively) with the results and evaluation of the creative process. It is therefore desirable to study the intrinsic properties of the creative thought dynamics in contexts in which creativity represents a dominant factor. Among the domains in which creativity plays an essential role is advertising. By structural analysis of a large mass of past advertising ideas we isolated a set of conceptual structures which characterize generically creative ideas. In order to validate these findings, we constructed idea-generating routines that lead to these conceptual structures. To ensure that human creativity does not interfere with the performance of those routines, we implemented them by computer. The computer-generated ideas ranked significantly higher on a creativity scale than the ideas produced by the human subjects. In view of the fact that the computerized routine is not performing any complex creation, the focal question raised is why do human judges perceive its outcomes as superior to human ideas performing the same task?

## **Introduction**

Imagine you found out that ideas invented by a computerized idea generator are rated higher by independent experts than ideas created by a group of individuals who were asked to perform the same task. Would you praise the designer of that computerized routine for his/her great achievement of inventing the “creative computer” or would you question why was the human talent which is otherwise so potent in coping with complex cognitive challenges, creating such poor ideas. Or may be you would question whether the humans are systematically fooling themselves into calling creative those ideas which correspond to other hidden, internal, but universally shared patterns.

In this paper we report a study utilizing a simple computerized routine which could be easily followed by the human individuals who generated the ideas, yet by choosing their own preferred solution plan they failed to reach the creative level obtained by the routine-generated ideas. In view of the fact that the computerized routine is not performing any complex creation, the focal question raised is why do human judges perceive its outcomes as superior to human ideas performing the same task?

This question is particularly intriguing since creativity is considered to be the ultimate intrinsically human activity, a highly complex process, which is difficult to formalize and control. Although there is a general agreement regarding the distinctive nature of the creative *product* (e.g., idea, painting, poem etc.), there is a controversy among researchers over the extent of the distinctive nature of the creative *process*. Some researchers hold that the creative thinking process, is qualitatively different from “ordinary” day-to-day thinking (see Guilford, 1950; Koestler; 1964; Wallas

1926; MacJinnon, 1970), and involves a leap which can not be sufficiently formulated, analyzed, or reconstructed. This leap is usually treated as the “creative spark”. Others adopt a reductionism view that creative products are the outcome of ordinary thinking, only quantitatively different from every day thinking (Wiesberg, 1993; Perkins 1981, 1988).

Because creative ideas are different from those arising usually in normal conditions, people are led to believe that in order to obtain them one has to ensure conditions dramatically different from the usual available ones. The feeling that one has to overcome mental obstacles/barriers in order to reach creative ideas, leads to the belief that one has to ensure “total freedom” by eliminating directional guidance, constraints, criticism, and thinking within bounded scope (Csikszentmihali 1996). The elimination of those barriers is expected to increase the accessibility of ideas that can be drawn and contemplated from a typically infinite space of ideas, during the creativity process (e.g, Koestler, 1964; Grossman, Rodgers and Moore, 1988; Parnes, 1992).

The total freedom view prompted the emergence of various methods such as “brainstorming”, Synectics, Lateral Thinking, Random Stimulation etc. which share instructions of withholding judgment and relying on analogies from other members in the group (synergetic effect) or on randomly selected forced analogies (e.g., De-Bono, 1970 and 1992)). “Group effects” are supposed to emerge based on the assumption that all men have the ability to solve the problem and manifest creativity. Hence, a group of people that think together can suggest more new ideas and accelerate the ideation process. This family of methods relies on the assumption that enhancing randomness, breaking rules and paradigms, and generating “anarchy of thought” increase the probability of creative idea emergence.

In spite of the dominance of these methods in the practical world<sup>1</sup> their efficiency has been questioned by a number of researchers (Weisberg 1993; Connolly, Routhieaux, Schneider 1993; Diehl, Stroebe 1991; Diehl, Stroebe 1987; Paulus, Dzindolet, Poletes and Mabel, 1993; and Bouchard 1969). They include reports that ideas suggested by individuals working alone were evaluated as superior to ideas that were suggested in brainstorming sessions. However, the performance of problem solvers instructed to “break the rules, get out of the square and change paradigms” was not significantly better than that of individuals who were not given any instructions at all. One of the outcomes tends to be the “illusion of productivity” which involves heightened satisfaction of the group from the process itself but dissatisfactory from the quality of the ideas generated (Stroebe, Diehl and Abakoumkin, 1992; Paulus, Dzindolet, Poletes and Mabel, 1993).

The failure of these methods to improve creative outcomes has been explained by the unstructured nature of the issues sought and the absence of clear progression rules and appraisal criteria. It is doubtful whether deliberate activity in this case can modify implicitly formed interpretations (such as those obtained when associations are invoked randomly) and promote a solution to the problem (e.g., Dominowski, 1995; Perkins, 1981). Only in a world with structure can search be selective and systematic, otherwise one lacks the ability to recognize that the goal has been achieved (Simon, 1971). Reitman (1964) observed that many problems that lack a structuring framework are *ill-defined* in that the representations of one or more of the basic components - the initial state, the operators and constraints and the goal - are seriously

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<sup>1</sup>Many organizations are using these methods and report success. Among them are: IBM, Dupont, RCA, Motorola, U.S steel and U.S government.

incomplete, and the search space is exceedingly large. Indeed, many ill-defined problems seem difficult, not because we are swamped by the task of searching through an enormous number of alternative possibilities, but because we have trouble thinking even of one idea worth pursuing. There is no wonder therefore, that “total freedom” does not ensure surprisingness of the chosen ideas, in fact there are claims contending the contrary.

Findings in the area of cognitive psychology provide support to the conclusion that the detection and use of progression rules may even result in enhanced surprisingness. For example, according to Perkins (1981), adherence to a cognitive frame of reference involves sensitivity to the “rules of the game” and by functioning within a frame, a better position is achieved to notice or recognize the unexpected. Finke, Ward, and Smith (1992, p. 32) noted that “...restricting the ways in which creative cognitions are interpreted encourages creative exploration and discovery and further reduces the likelihood that the person will fall back on conventional lines of thought.”

It appears, therefore, that creativity tasks adhering to the “total freedom” view may provide the participants with the enjoyable sense of engaging in some divine compositional virtuosity while navigating in an infinite space of potential ideas, but in the end the outcome ideas may be inadequate (Stroebe, Diehl and Abakoumkin, 1992; Paulus, Dzindolet, Poletes and Mabel, 1993; Connolly, Routhieaux and Schneider, 1993).

The postulated association between creativity and total freedom is challenged also by recent findings in advertising research, an area in which creativity plays a central role. It was discovered that certain regularities underlie successful ads and those that match some of these regularities stand out as more creative than ads that don't fit

these structures. Goldenberg, Mazursky, and Solomon (1999a) termed these regularities “creativity templates” and reported that 89% of the award-winning ads match as few as six major templates, about 25% of which could be schematically depicted as a simple template termed *Replacement*.

The following algorithm is required to perform the standard task of a "creative", according to the Replacement template in advertising: Given a product (denoted from now on by P) and a trait (T), (s)he has to come with a creative idea conveying the message that links P to T. The algorithm uses the Replacement operator, which involves substituting a particular part of a conceptual system with another object/part fulfilling the same function. In the present framework, the Replacement operator basically involves replacing an object S (“symbol”), which is universally identified with the trait T, by P. The effect is enhanced if S is placed in a situation in which its trait T is essential. Moreover, the replacement operation can be iterated: Rather than P, one can use parts of it, or aspects of it, or objects associated with it, to replace the corresponding elements associated with S (for more details about the algorithm see Goldenberg, Mazursky and Solomon, 1996, 1999b).

To illustrate the Replacement template, consider the advertisement of “Nike-Air” shoes (see figure 1). The shoe has a trait (T) of “cushioning and absorbing the shocks” caused by various sport activities. The visual component in this ad shows a group of firemen holding a shoe serving as a salvation sheet in escaping from a burning building. The Replacement template is obtained when a product P (e.g., sneaker) or one of its aspects A (e.g. shape), replaces the corresponding aspect of the symbol S (e.g., fireman sheet) in a situation where its trait (T) (“cushioning/absorbing shocks”) is crucial (saving a person from being hurt). The aspect A substitution can be represented by a link between P and a S. *This link is in general different from a simple*

*pictorial metaphor because the substitution of A into S may lead to a new entity, which quite often does not exist in the real world.*

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*Insert Figure 1 about here*

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### **Algorithm description**

The general scheme and the implementation in the case of the aforementioned example of Nike Air are given in Figure 2. Figure 3 illustrates how a sequence of four elementary operators - *Split*, *Exclude*, *Include* and *Link* - generate a *linking operator*. The exclusion operator removes an attribute (or a component, e.g. the fireman sheet is excluded from a suicide situation) after being split from its links. The inclusion operator introduces a new element, S, to the environment under consideration (e.g. if the environment is a suicide situation or a rescue from a burning building a Nike Air shoe is an included component). The linking operator substitutes the excluded component by another (using a shoe as a sheet).

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*Insert Figures 2, 3 and 4 about here*

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The recurring incidence of the Replacement structure can be exemplified by the Bally shoe ads in Figure 4. The advertisements are intended to associate the shoe with the sense of freedom to the foot by replacing the contour of an island or clouds (symbols of freedom) by the shape of a foot. Although at first glance it may appear remote, the ad creative concept for Bally shoes, shown in Figure 4, has the same fundamental scheme as the Nike-Air sneakers ads. The fact that a template consists of a sequence of well-defined and first principle operations working in a closed system facilitates the definition of an algorithm along with a database that can produce ad ideas schematically.

The database of the computer was composed of 270 possible traits (T) that were collected from various magazines. Although the database is not conclusive it is

sufficiently large in the sense that in our experiments all traits were chosen randomly and still, they could be accounted for by the available database.

A list of 900 symbols S was constructed according to the replacement template definition. The symbols were collected by asking individuals to write for each trait the most powerful symbol that comes into mind. 3-4 symbols that appeared in most of the questionnaires for each trait were included in this database. Note that no requirement of creativity was imposed in generating this database: Only the most obvious objects, persons, or parts, that were most directly and naturally associated, were included.

The execution of the Replacement scheme involves the following steps

(Goldenberg, Mazursky and Solomon, 1996; 1999a):

1. Define the relevant trait T for a given product P.
2. List symbols S that completely and unquestionably invoke T.
3. Construct the P-space consisting of the objects O that are strongly correlated to P.
4. Substitute an aspect A of one of the O's in place of the corresponding aspect of S.
5. Repeat the stages above to produce more ideas.

Steps 2-5 are programmed as an automatic routine. The input for the program is a product P, 3 objects (O) associated to P and the trait T. The program selects from the data base the S's connected to T and then performs the replacement of aspects A (shape, smell, function, motion, role) of S by the corresponding aspects of the O's.

Once the idea is specified verbally, the visual manipulation can be easily implemented. Hence, the output of the program is in the form:

$$A(O) \leftrightarrow A(S)$$

Table 1 presents several examples of advertising ideas produced by the program.

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*Insert Table 1 about here*

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The above procedure has been transformed to an automatic idea-generating routine. Ideas generated by a computerized routine were presented to judges along

with ideas on the same theme appearing in ads that won creativity competition in advertising; ads published in leading international magazines such as Time, Newsweek, Vogue, and New Yorker; and advertising ideas generated by human individuals. Judges that were blind to the hypotheses of the research were asked to classify the ideas according to their creativity and originality.

## **Studying the Dominance of a Template in Creative Activity**

The Study was designed to compare the creativity levels of ad ideas generated by four different sources:

1. One Show contest Award-winning ads .
2. Magazine ads, appearing in highly ranked magazines such as Time, Vogue and Newsweek.
3. Template-based ideas generated by the computerized Replacement routine.
4. Ad ideas produced by Non-professional individuals.

To ensure compatibility between ads generated by these four sources, all the selected ads were comprised of equal representation of four product categories: cars, electronic appliances, alcoholic beverages, and food products. Altogether, each source was represented by 12 ads, composed of three ads per product category.

The ads from the award winning collection and magazines were randomly chosen from the set of ads that conformed to the category classification requirement. The computer-based ads were generated by feeding the software with the product-quality pairs compatible with those of the award winning and magazine ads. The “laymen” ads were generated by a group of 15 individuals all were holding at least an undergraduate degree. Each of these participants received six product-trait pairs for which they were asked to generate ad ideas. These tasks were performed individually without interaction among the participants. Two persons experienced in the field of

advertising have chosen the top 12 ads (three ideas per category) based on their creativity and originality to generate the “laymen” ads set.

All the 48 ads pertaining to the four sources for the 4 categories were then submitted to a group of 32 individuals all of whom held a university degree (at least an undergraduate degree, non of which was in advertising or related areas of specialization), serving as judges of these ads. They were given a verbal description of all the ads and asked to rate each of these ads according to their level of creativity and originality on five point scales. The ads were handed to the judges in random order. These judges were blind to the origin of the ads and to the purpose of the study.

## **Results**

Comparison between the four sources indicated that judgments of creativity and originality differed between the four ad sources ( $F(3,45)=9.71$ ,  $p<.0001$  for the creativity judgment, and  $F(3,45)=9.59$ ,  $p<.0001$  for the originality judgment). Table 2 summarizes the mean judgments in the four ad source sets. Pairwise comparisons revealed that both in creativity and originality judgments the award winning ads were rated highest, although not significantly different from the magazine ads and the computer generated ideas (all  $t$ 's. n.s.). However, in both cases laymen generated ads that were rated as inferior ( $p<.04$  or better in the three analyses comparing winning ads and laymen ads; magazine ads and laymen ads; and software and laymen ads).

A similar pattern of judgments characterized the four product categories as manifested in the non-significant interaction between the judgments and the category factors. Regarding both the creativity and originality judgment, the ratings were not affected by the type of product category (the category main effect was  $F(3,45)<1$ , n.s., for the creativity judgment, and  $F(3,45)<1$ , for the originality judgment). Moreover,

the pattern of judgments drawn from the various sources was not sensitive to the chosen product category as evidenced in the non-significant Category X Source interaction ( $F(3,45)=1.16, p>.35$  in the case of creativity judgments, and ( $F(3,45)=1.57, p>.18$ ) regarding originality judgments).

Finally, in order to focus more sharply on the difference between template-matching ad ideas and non-template ideas rather than on the routine-generated versus laymen-generated ideas, the value of ideas based on appearance or absence of template-matching ads were assessed by contrasting three groups of ideas: (a) Ideas that were not template-matched, (2) Template-matched ideas generated by the computer program, and (3) Template-matched ideas generated incidentally by the other, non-computer sources. Table 3 displays the mean ratings of ideas for these three groups. The ratings differed among the groups both in terms of creativity judgments ( $F(2,45)=5.20, p<.01$ ) and originality ( $F(2,45)=3.33, p<.05$ ). According to this analysis, template-matched ideas generated in a human-ideation process were rated highest, template-matched ideas generated by the computer were rated lower, and non-template ideas were rated lowest. This finding was obtained both in the case of creativity and originality judgments.

### **What can be learned from the mechanical mimicry of creativity by a computer?**

The human inventors failed to reach even the low threshold of creativity determined by the simple automatic routine. While criticism has been raised in the past regarding the unstructured nature of creativity, the present research illuminates the degree of impedance in creativity that human inventors face under conditions of freedom of thought. Viewed from a different angle, the judges, not differing in expertise (or any

other relevant dimension) from their fellow inventors, have rated the routine-generated ideas higher than those produced by those human inventors.

The “freedom of thought” orientation is particularly puzzling in view of the attempts made by the human kind throughout history to understand the regularities in nature and to utilize that knowledge for the improvement of their own well being. Csikszentmihali (1996) contended that “as we ride the crest of evolution we have taken the title of creator” (p.5); we elevated our status from being helpless, to one of understanding nature in many areas, and even to being in control in a few others. Yet, when it comes to planned creative thinking, we choose to dissociate, unfold, untangle, randomize, etc., hoping that by the end of that task, the greatest, unsurpassed ideas will emerge.

In creative thinking we seldom utilize even those regularities that we have at hand. Considering the present century alone relational structures have been developed in a variety of disciplines such as Linguistics (Eco 1986; Chomsky 1978), Anthropology (Levi-Strauss 1974), Random Graphics (Palmer 1985), Venture and Transitional Management (Kauffman 1995), Psychology (Simon 1966), and Artificial Intelligence (Minsky 1988). At least some of these, beyond serving as frameworks of historical organization, are potentially resourceful for inventive thinking.

One justification for examining regularities as potential sources for creativity is that structures resembling the replacement template, developed and applied in other fields have been valued as creative (e.g. Altschuler 1986). Creativity perception may be enhanced because these structures match certain *attractors*, namely, paths that the self-organized mind tends to follow (Kelso 1997). Evidence for the superior creativity of template-matching ideas has been found in the contexts of new product ideation

Goldenberg, Mazursky, and Solomon (1999b), in technological innovations (1999c, see also Altschuler 1986), and in advertising (1999a).

The mounting evidence seems to indicate that one has to reevaluate the way that search for creative ideas should be viewed. There is no argument about the value of randomness: Indeed, several of the greatest inventions in history occurred randomly, as non-replicable “sparks”. However, randomness should be reserved only to problems in which constraints originating in non-creative requirements limit the solution space to a unique or to a very small number of solutions. Regarding most creativity tasks the probability of finding randomly a creative idea might vanish. Considering all the useless ideas that accumulate during such a random search, relying on randomness as a normative framework for creativity might be harmful, or inefficient at best.

Our research shows that certain regularities may serve as skeletons or infrastructure for screening creative ideas. If we can define these regularities a-posteriori we can reconstruct a-priori skeletons which will consist of their main parameters and can be fed in only by those ideas that conform to these parameters. In this newly generated virtual world most of the ideas are likely to be perceived as creative, even though the well-defined rules and the exhaustive search used to obtain them do not easily reconcile with what we traditionally have liked to view as pure “creativity”. Yet, in view of the numerous problems we are called upon to solve, in our day-to-day lives, and if we accept that creativity is assessed by the way it is perceived in the eyes of the beholder, it seems that we ought to reappraise our fundamental approaches to creativity and even reevaluate its operational definition.

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## Tables and Figures

Table 1: Examples of Replacement matching Ideas.

- An Apple Computer terminal offering flowers (for advertising Apple Computers friendliness).
- Temple Mountain Mosque with Tennis ball texture (for advertising World Cup Tennis Tournament in Jerusalem)..
- A cuckoo in the shape of a plane emerging from the cuckoo clock (for advertising the time accuracy of an airline company).
- Two Jeeps communicating in sign language (for silent car engine).
- A bullet shaped car (for fast car).

Table 2: Idea Ratings for the Four Sources

Creativity Ratings	Mean	S.D.
Winning Ads	3.26	.49
Magazine Ads	2.88	.55
Routine-Generated Ads	2.89	.48
Laymen-Generated Ads	2.22	.43
Originality Ratings	Mean	S.D.
Winning Ads	3.33	.55
Magazine Ads	2.85	.58
Routine-Generated Ads	2.89	.54
Laymen-Generated Ads	2.22	.46

Table 3: Idea Ratings Based on Template Utilization

Creativity Ratings	Mean	S.D.
Non-Template Ads	2.63	.62
Routine-Generated Ads	2.89	.48
Other Template-Based Ads	3.34	.35

Originality Ratings	Mean	S.D.
Non-Template Ads	2.66	.70
Routine-Generated Ads	2.89	.54
Other Template-Based Ads	3.28	.43

Figure 1 - An example for an idea which is perceived as creative - (Wieden & Kennedy, 1995, *The One Show Album*)

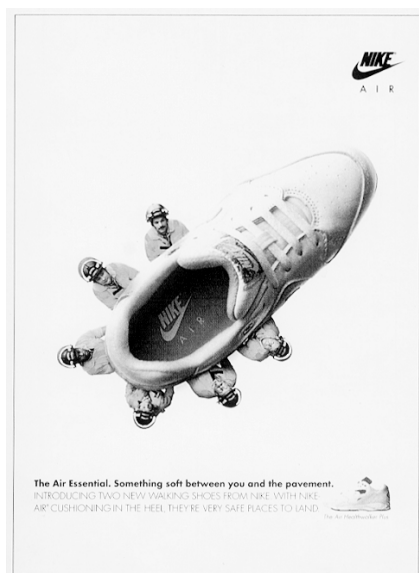


Figure 2 A general scheme of the replacement template.

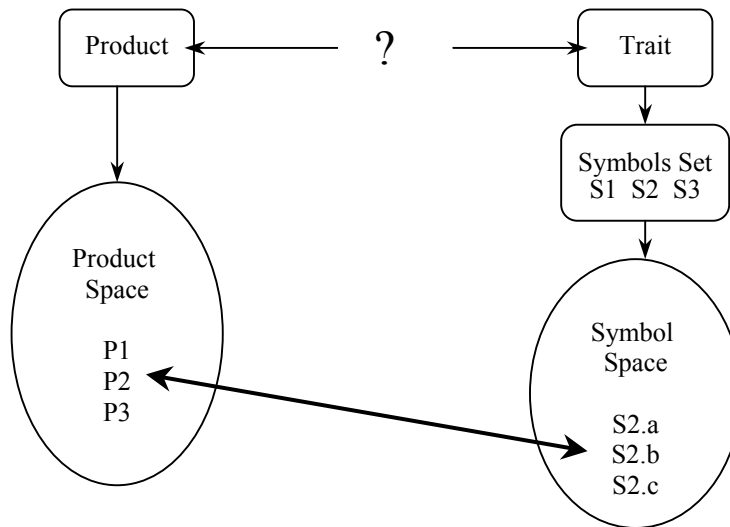


Figure 3 a) Inclusion of a Product's component to a situation, b) Split and Exclusion of the situation's components c) Linking

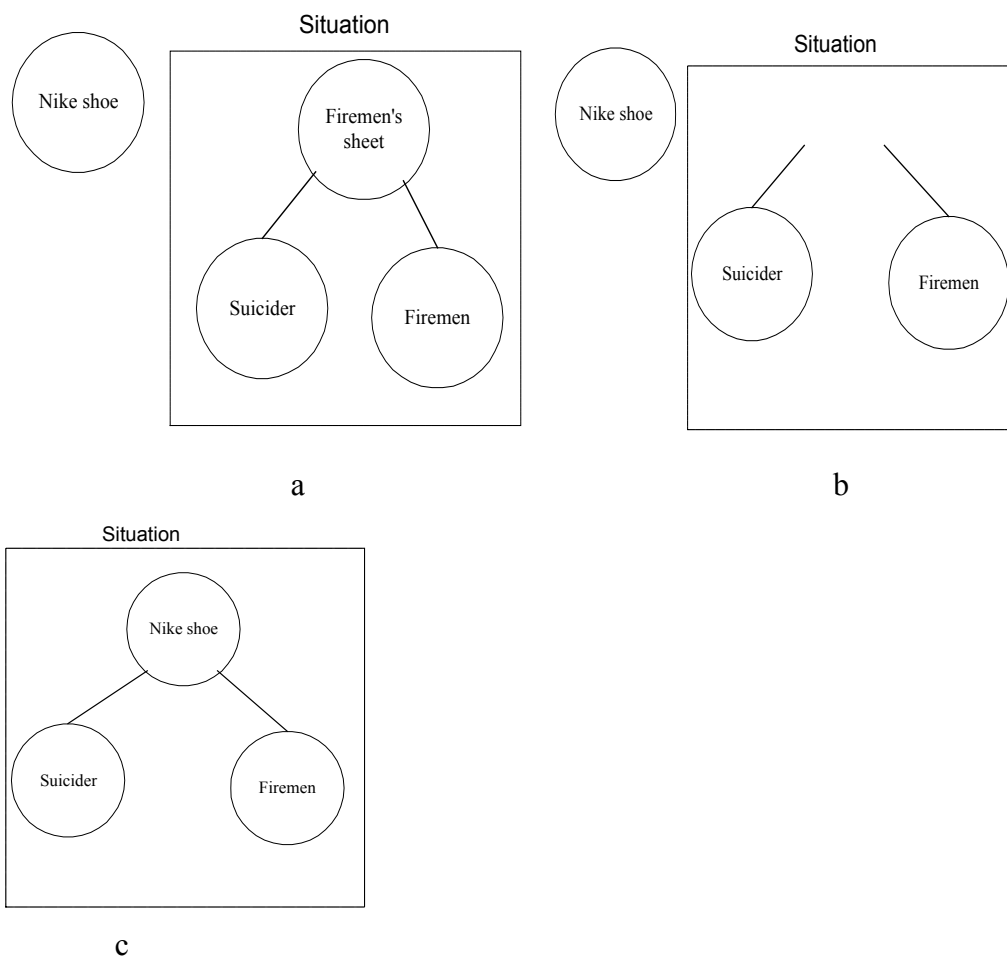


Figure 4: Examples for the Replacement Template (Wieden & Kennedy, 1995, The One Show Album)

