Influence of Artefact, Activity and Design Value-Based Statements on Solution Outcomes

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Abstract
A design brief is usually set by the client which includes various types of information such as the needs or requirements, target audience, technology aspects etc. A designer who receives this design brief brings one's own interpretation of what needs to be designed - a product, service, process or as a combination. Need or Design task Statement a key component of a design brief could be articulated as textual statements in several ways for a brief. We see a potential to look into the formulation of a need or design task statement in a brief at various levels of abstraction and see its influence on the generation of design ideas or solution outcomes. We framed three types of need statements based on - 'thing or artefact', 'activity' and 'aspired or desired design value' as part of design briefs that were given to participants who were then asked to generate design ideas. Design briefs with varied need statements were given to participants, in two formats - one group received the three statements in the sequence of artefact, activity and aspired value while the other received in the reverse order beginning with statement on aspired value first. The article would outline the findings of this study to understand the role of varied Design task statements and their influence on an individual thought and visualization process. The work would be relevant and help designers to redefine the briefs for both academic and professional settings.

Keywords: Need Statements and Types, Design Brief, Influence on Thinking

Design brief, its relevance, variant terms and components

Most design projects begin with the formulation of a *design brief* and many times a brief is initiated by the client who hands it over to a design practitioner. A *design brief* captures information related to the needs & requirements, context, target audience, project objectives, scope/ limitations etc. for something to be conceived in future. The UK Design Council defines *design brief* as – "A Design brief is a clear definition of the fundamental challenge or problem to be addressed through a design-led product or service. It is a structured statement that outlines goals, constraints, budgets and timelines. It communicates project outcomes, identifies potential risks and highlights how these will be mitigated." (p.18). Talking about the domain of advertisement, Rothenberg (1999) regards *briefs* as a plan of action for the agency's creative team while MacRury (2009), refers to *creative briefs* as a document used by the creative team to translate clients' objectives into a creative application. Cross (2005) talking about the take of design briefs in the domain of engineering design regards *briefs* to be a statement of requirements to which a designer responds back with a design proposal. Lawson (2005) regards briefs as important ingredients for kick-starting any design activity referring to the context and domain of architectural design. Paton and Dorst (2011), consider the *brief* to serve as a starting point for initiating projects in the domain of industrial design and state the objective of a design brief is to, "….reframe both the client's and designer's preliminary appreciation of the situation in order to create an actionable view of the project for both parties."(p.575). In various domains such as architecture, engineering and industrial design, advertisement, design briefs are considered as kick-starters for beginning any project.

Phillips (2004), discusses the variant terms used for *design brief* such as *marketing brief*, *project brief*, *job ticket* or *innovation brief*. Hackley (2005), talking about the domain of advertisement proposes two types of briefs – 1. A *client brief* that contains information for undertaking the client's task such as the company, the brand, the product, information on the market segment, timeline, budget available etc 2. A *creative brief* that is written by the account planner of the agency for their creative team based on the client's brief. Design brief is referred to by variant terms based on the domains of practice. The term *mission statement* is used by Ulrich and Eppinger (2016) to refer to a document in the domain of engineering and product design that outlines the objectives, constraints and market opportunities for a future project. Blyth and Worthington (2010) writing about *briefs* in the domain of architecture refer to it as a statement *of need.* Design brief is referred to by variant terms such as *marketing brief*, *project brief*, *job ticket*, *innovation brief*, *client brief*, *creative brief*, *mission statement*, *statement of need* depending upon the domain of professional practice.

Design brief has an important role and relevance for initiating any new design activity across varied domains. It would be valuable and relevant to know the various components of a design brief. A design brief may be constituted of varied components. Silk et al (2014) regard *context* – information on the intent of the project and the target audience; *need statement* – brief and concise instruction on the functional requirement; *goal* – provides information on what needs to be achieved while *constraints* indicate any limitations or criteria for the expected design solution that would be considered worthy to be taken further. They regard *context*, *need statement*, *goal* and *constraints* as four important components to be considered while formulating a design brief.

Types of need statements

For our study we considered a *need statement* as one that captures the design requirement succinctly. Any given design brief can have innumerable and varied formulations of need statements. There are a number of authors who have used the terms 'design brief' and 'need statements' interchangeably (Cross, 2005; Sosa et al, 2018). Based on review of literature two broad orientations of need statements or briefs can be comprehended: 1. *Problem-oriented briefs* – that put forth only the situation or the undesired condition 2. *Solution-oriented briefs* – that express or indicate a target solution (Restrepo & Christiaans, 2003; Sosa et al, 2018).

March (1976), Roozenburg (1993) and Dorst (2010) discuss three different modes in thinking: 1. *Deductive thinking* 2. *Inductive thinking* 3. *Abductive thinking*. Each of these modes are shown to differ from one another in their usage of the three attributes: '*what*' – which is about the *artifact* or object, service, system to be designed; '*how*' – related to the *activity* or working principle, usage scenario or behavior of the design proposal ; and '*results or the design value*' – is what one aspires to bring in as the value of design proposal.

For our study three need statements were created based on the theoretical framework for thinking in design - 1. Artefact based 2. Activity based 3. Design value based

Similar studies undertaken earlier

Fricke (1996) conducted a study where a group of designers were presented with a precisely formulated design brief. While another group was presented with a design brief that had imprecise formulation of a brief. Those presented with precisely formulated briefs attended to it without additional queries, while those who received imprecisely formulated briefs regarded it to be incomplete. Liu et al (2018) studied the influence of open-ended, decision making and constrained statements on the cognitive behaviours of participant designers. This study found that open-ended statements promoted novel ideas and triggered divergent thinking, while constrained and decision making statements promoted convergent thinking and better performance. Zahner et al (2010) showed in their study that design problems with abstract formulations stimulated original solutions but with lower usefulness score. Gonçalves et al (2012) studied the influence of textual stimuli given as part of design brief on the quality of ideas. They found that distant stimuli promoted a higher number of flexible and original ideas from participants compared to near stimuli.

The various research studies carried out earlier have shown that formulation of design brief in terms of being precise, concrete or imprecise, abstract influenced the perception of a given problem and on a designer's cognition. Open-ended, abstract statements in design briefs triggered divergent thinking and novel ideas while constrained problems promoted convergent thinking and better performance with higher score on usefulness. Earlier work did not look at the influence of need statements created based on the theoretical framework for thinking in design - 1. Artefact based 2. Activity based 3. Design value based on the generation of design ideas

Our study

This research study looks at three types of need statements created based on design thinking attributes – *artefact*, *activity* and *design value*. The two statements generated based on

activity and *design value* do not state or hint on the kind of solution making them *problem-oriented need statements*. While the statement based on artefact suggests a solution and belongs to the category of *solution-oriented need statement*. For the study three types of need statements were framed, *two problem-oriented* and *one solution-oriented statement*. Table 1 shows the need statements considered for the study.

Types of Need statements	**Need statements considered for the study**
Solution-oriented need statements (artefact or object)	Design an *internet radio* keeping the elderly in mind.
Problem-oriented need statements (activity)	Design the *activity of listening to music* keeping the elderly in mind.
Problem-oriented need statements (design value)	Design an *intuitive, pleasurable music experience* keeping the elderly in mind.

Table 1: Artefact, activity and design value-based need statements for the study

Research approach for the study

A total of 29 students (13 females and 16 males) pursuing their Master's degree in design participated in the study. 15 students (6 females and 9 males) of 3rd semester in 2021 and 14 students (7 females and 7 males) of 1st semester in 2022 took part in this study. A total of three variants of the design brief were created with each variant containing only one type of need statement. Each design brief had textual content with - one of the three need statements; context in terms of intended users or target audience, company, instructions for generation and visualization of design ideas. The design brief and the three need statements considered for the study are outlined in Table 2 below.

Design brief	**Need statement along with the no. of participants**
A company wants to look at interesting product ideas for the elderly group to access internet music. This product may be used by the elderly for various usage scenarios - while they are walking or sitting in the park, when they are at home etc. "**Design an internet radio keeping the elderly in mind**." Generate your design ideas on blank sheets of paper in a time of 30 minutes. Use one page for one idea. At the end of 30 minutes take good photographs of each of your ideas and insert them in the same word document and email the document back to me.	Design an *internet radio* keeping the elderly in mind (artefact). Design the *activity of listening to music* keeping the elderly in mind (activity). Design an *intuitive, pleasurable music experience* keeping the elderly in mind (design value).

Table 2: Design brief and the three need statements

All the participants who took part in the study were asked to attend to all the three variants of the design brief. The participants were asked to generate ideas with the three statements one after the other in a sequence. The 29 participants were divided into two groups -
Group A: received the statement in the order beginning with - *internet radio*, followed by *activity of listening to music* and *intuitive*, *pleasurable music experience* in the end.

Group B: received these statements in the reverse order beginning with *intuitive*, *pleasurable music experience,* followed by *activity of listening to music* and *internet radio* in the end. Participants of both the groups were given a time of 30 minutes to generate design ideas for each design brief variant. The participants of both these groups were asked to generate design ideas with one idea represented on one page. All the design idea outcomes were collected from the participants for analysis. Table 3 shows the two groups and the order of need statements presented to the two groups - *Group A* and *Group B*.

Group A: order of need statements given to participants	**Group B: order of need statements given to participants**
1. Design an *internet radio* keeping the elderly in mind.	1. Design an *intuitive, pleasurable experience for musi*c keeping the elderly in mind.
2. Design the activity of *listening to music* keeping the elderly in mind.	2. Design the activity of *listening to music* keeping the elderly in mind.
3. Design an *intuitive, pleasurable experience for music* keeping the elderly in mind.	3. Design an *internet radio* keeping the elderly in mind.

Table 3 : The order of the need statements presented to Group A and Group B

The entire experiment was conducted in online mode only. Each participant was sent an email with the design brief outlined in a word document. The participants were given a time of 30 minutes to complete the task for a given design brief variant. Once the participants had completed the task they were told to take photographs of their design idea outcomes and embed them in the same word document shared by the researcher earlier. The participants were asked to email this word document back to the researcher. This procedure was the same for the three design brief variants shared with the participants sequentially. During the entire session the researcher was available to converse if needed with the participants on an online meeting platform. This online platform also helped the researcher to moderate the time given for each design brief variant.

Analysis and findings of the study

The design idea outcomes collected for the study were analyzed for the following parameters:

1. *Average number of ideas* or *fluency* for each 'need statement.
2. *The concreteness* in ideas analyzed at three levels - macro, abstract and concrete.
3. *Novelty* of design idea outcomes.

The analysis and findings for each of the above parameters is presented below:

1. *Average number of ideas* or *fluency* for each 'need statement: The number of ideas generated by each participant for each given design brief variant containing one need statement was counted groupwise - Group A and Group B. The total number of ideas for each group was categorized based on the three need statements as shown in table 4.

Need statement	**Group A** (15 participants) **no. of ideas**	**Group B** (14 participants) **no. of ideas**
Design an *internet radio* keeping the elderly in mind.	total 42 ideas (2.8 ideas/ person)	total 22 ideas (1.57 ideas/ person)
Design the activity of *listening to music* keeping the elderly in mind.	total 27 ideas (1.8 ideas/ person)	total 24 ideas (1.71 ideas/ person)
Design an *intuitive, pleasurable experience for music* keeping the elderly in mind.	total 24 ideas (1.6 ideas/ person)	total 33 ideas (2.36 ideas/ person)
Total number of ideas for each group	93 ideas (6.2 ideas/ person)	79 ideas (5.64 ideas/ person)

Table 4: The number of ideas for need statements for Group A and Group B

For Group A the number of ideas/ person ranged from *2.8 ideas/ person* for need statement with the *artefact as internet radio*; *1.8 ideas/person* for need statement with the *activity of listening to music*; and *1.6 ideas/ person* for need statement with *design value as intuitive, pleasurable experience for music*.

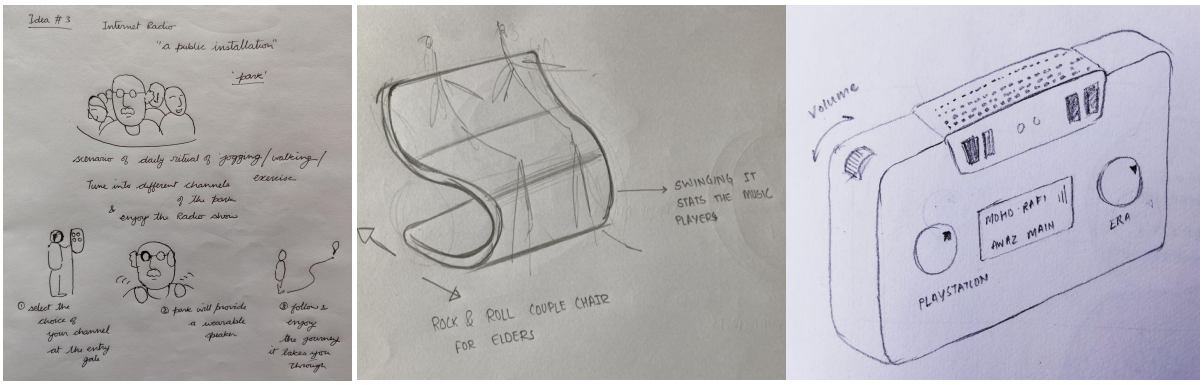
For Group B the number of ideas/ person ranged from *1.57 ideas/ person* for need statement with the *artefact as internet radio*; *1.71 ideas/person* for need statement with the *activity of listening to music*; and *2.36 ideas/ person* for need statement with *design value as intuitive, pleasurable experience for music*.

Comparing the results for each statement for the two groups it can be seen that the number of ideas/ person are higher for the need statement that is given first and gradually drop for the need statements given 2nd and 3rd in the sequence. There was a decrease in the number of ideas/ person for both Group A and Group B. It was also observed that there was a minor decrease in the total number of ideas for Group B which had the sequence beginning with a design value based need statement. Group A had a total of 93 ideas for 15 participants with 6.2 ideas/ person while the number of ideas slightly dropped to 79 ideas for 14 participants in Group B with 5.64 ideas/person. *The number of ideas/ person or fluency was higher in the sequence: artefact-activity-design value than for the sequence: design value-activity-artefact.*

2. Concreteness in design ideas: All the design idea outcomes for the two groups were tagged based on three parameters –

a) *macro* when the idea represented does not show the product form, its use but shows one the overall context or the ecosystem.
b) *abstract* when the idea represented communicates product functionality but lacks a clear product form.
c) *concrete* when the idea represented communicates both a clear product functionality and form.

Figure 1a, 1b and 1c show selected design ideas tagged as *macro*, *abstract* and *concrete* respectively for the need statement ‘Design and internet radio keeping the elderly in mind’.



1a. **1b.** **1c.**

Figure 1a. Idea tagged as *macro*, 1b. *abstract* and 1c. *concrete*

The table 5 below shows the number of ideas for each need statement for the two groups - Group A and Group B that have been tagged or coded as being *concrete*. Only the ideas tagged as *concrete* are considered for discussion in this article, while the ideas tagged as abstract and macro have not been discussed.

Need statement	**Group A** (15 participants) **no. of concrete ideas**	**Group B** (14 participants) **no. of concrete ideas**
Design an *internet radio* keeping the elderly in mind.	27 ideas (1.80 ideas/ person)	15 ideas (1.07 ideas/ person)
Design the activity of *listening to music* keeping the elderly in mind.	16 ideas (1.06 ideas/ person)	13 ideas (0.93 ideas/ person)
Design an *intuitive, pleasurable experience for music* keeping the elderly in mind.	13 ideas (0.87 ideas/ person)	20 ideas (1.42 ideas/ person)
Total number of ideas tagged as concrete for each group	56 ideas (3.73 ideas/ person)	48 ideas (3.42 ideas/ person)

Table 5: The number of ideas for need statements for Group A and Group B tagged as *concrete*

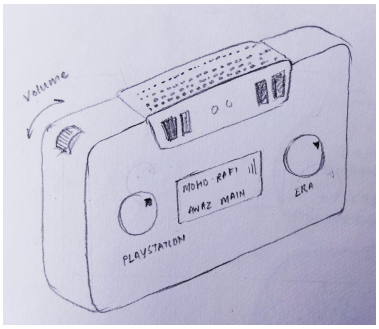
For Group A the number of ideas/ person tagged as *concrete* ranged from *1.8 ideas/ person* for need statement with the *artefact as internet radio*; *1.06 ideas/person* for need statement with the *activity of listening to music*; and *0.87 ideas/ person* for need statement with *design value as intuitive, pleasurable experience for music*. The decrease in concrete ideas from artefact to design values can be observed to be halved.

For Group B the number of ideas/ person tagged as *concrete* ranged from *1.07 ideas/ person* for need statement with the *artefact as internet radio*; *0.93 ideas/person* for need statement with the *activity of listening to music*; and *1.42 ideas/ person* for need statement with *design value as intuitive, pleasurable experience for music*. There is a minor decrease in the number of concrete ideas.

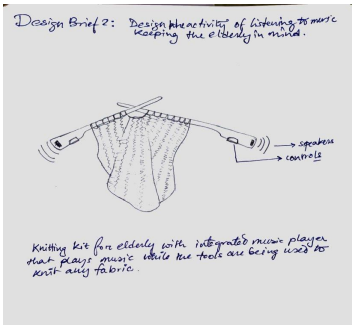
Comparing the results for each statement for the two groups it can be seen that the number of ideas/ person tagged as concrete are higher for the need statement that is given first and gradually drop for the need statements given 2nd and 3rd in the sequence. There was a decrease in the number of ideas/ person tagged as concrete for both Group A and Group B. Group A had a total of 56 ideas tagged as concrete for 15 participants with 3.73 ideas/ person while the number of ideas tagged as concrete slightly dropped to 48 ideas for 14 participants

in Group B with 3.42 ideas/person. *The number of concrete ideas/ person was slightly higher in the sequence: artefact-activity-design value than for the sequence: design value-activity-artefact, but the difference is not significant. The number of concrete ideas was highest for the need statement presented first and decreased for the next two need statements.*

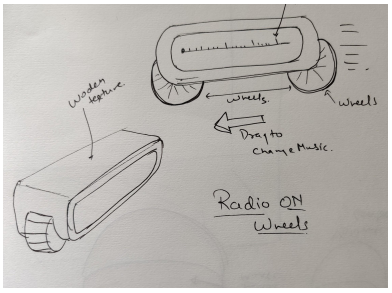
3. Novelty in design ideas: The design idea outcomes for each of the need statements were evaluated for quality of ideas for the novelty factor by the faculty. Figure 2 shows examples of design ideas tagged as novel by the faculty member for the three need statements - Design an *internet radio* keeping the elderly in mind; Design the *activity of listening to music* keeping the elderly in mind and Design an *intuitive, pleasurable experience for music* keeping the elderly in mind.



Design an ***internet radio*** keeping the elderly in mind



Design the ***activity of listening to music*** keeping the elderly in mind



Design an ***intuitive, pleasurable experience for music*** keeping the elderly in mind

Figure 2. Design Ideas tagged as *novel* for the three need statements

Table 6 below shows the number of ideas that were marked as novel (including those with potential to be novel with better articulation) by the faculty member by evaluating all the design ideas that were generated by the participants. Those ideas that were tagged as novel were then mapped to the two groups under the three need statements. The number of novel ideas were compared to the total number of ideas generated for each category of need statement and for each group of participants.

Need statement	**Group A** (15 participants) **no. of novel ideas**	**Group B** (14 participants) **no. of novel ideas**
Design an *internet radio* keeping the elderly in mind.	06 out of 42 ideas (14.28% of ideas were novel)	02 out of 22 ideas (9.09% of ideas were novel)
Design the activity of *listening to music* keeping the elderly in mind.	02 out of 27 ideas (7.40% of ideas were novel)	04 ideas out of 24 (16.66% of ideas were novel)
Design an *intuitive, pleasurable experience for music* keeping the elderly in mind.	03 out of 24 ideas (12.50 % of ideas were novel)	02 out of 33 ideas (6.06% of ideas were novel)
Total number of ideas tagged as concrete for each group	11 out of 93 ideas (11.82% of ideas were novel)	08 out of 79 ideas (10.12% of ideas were novel)

Table 6: The number of ideas for need statements for Group A and Group B tagged as *novel* by faculty

In Group A percentage of ideas tagged as *novel* ranged from *14.28%* for need statement with the *artefact as internet radio* (the first need statement given); *7.40%* for need statement with the *activity of listening to music*; and *12.50 %* for need statement with *design value as intuitive, pleasurable experience for music* (the last need statement given). There is not much of a difference and only a minor decrease in the percentage of novel ideas for need statements with *artefact* and *design value.* The percentage of novel ideas was the least for the need statement with *activity* mentioned.

In Group B percentage of ideas tagged as *novel* ranged from *6.06%* for need statement with the *design value as intuitive, pleasurable experience for music* (the first need statement given); *16.66%* for need statement with the *activity of listening to music*; and *9.09 %* for need statement with *artefact as internet radio* (the last need statement given). There is not much of a difference but we see a minor increase in the percentage of novel ideas for need statements with *artefact* and *activity.* The percentage of novel ideas was the least for the need statement with *design value* mentioned.

Comparing the results for each statement for the two groups it can be seen that the *percentage of ideas tagged as novel are higher for the need statement that is given first and decrease for the need statements given later for the sequence*: *artefact- activity- design value*. For the sequence: *design value- activity -artefact the percentage of ideas tagged as novel gradually increase for need statements given later.* This observation shows that the sequence of need statements given has an influence on the percentage of ideas tagged as novel, but this needs to be established further with a larger sample size.

Conclusions and scope for future research

This study is relevant to both design teachers and students in the context of *setting the briefs* for design projects. It shows the formulation of *varied need statements* based on the deductive, inductive and abductive thinking framework in design. The general finding of the study showed that the sequence of need statements considered : artefact-activity-design value and vice versa influenced the ideational fluency, number of concrete ideas/ person and the *novelty percentage*. The followings are the specific findings:

1. *The number of ideas/ person or fluency was slightly higher for the group with the sequence : artefact-activity-design value based need statements than for the sequence: design value-activity-artefact based need statements.*
2. *The number of concrete ideas/ person was slightly higher in the sequence: artefact-activity-design value than for the sequence: design value-activity-artefact, but the difference is not significant. The number of concrete ideas was highest for the need statement presented first and decreased for the next two need statements.*
3. The *percentage of ideas tagged as novel are higher for the need statement that is given first and decrease for the need statements given later for the sequence*: *artefact- activity- design value*. For the sequence: *design value- activity -artefact the percentage of ideas tagged as novel gradually increase for need statements given later.*

All the participants for this study were students pursuing a higher degree in the discipline of interaction design. Further study with a larger sample size and participants from diverse disciplines would help establish the findings and shed light on the phenomenon of the influence of varied need statements on solution outcomes with more clarity.

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