

# How do people “read” their desks: applying triad elicitation for investigating PIM

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## ABSTRACT

In this paper we describe the application of triad elicitation as an ethnographic research method. Triad elicitation was used as an explorative in-situ data collection method during a study into the handling of paper documents by information workers. Our results show that triad elicitation is a powerful method that delivers rich, well-structured, and easy-to-analyze field data.

## Author Keywords

Repertory grid, field research, ethnography, personal information management.

## ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

## INTRODUCTION

Qualitative user research has been widely applied in HCI to investigate user needs, discover usage problems, or test system design. HCI researchers and practitioners have successfully adopted a variety of techniques that deliver rich qualitative data containing unique contextual information about users, their environments, their problems and preferences, system use, etc. In the domain of PIM qualitative field studies such as diaries [4], observations [6] and interviews [2,8] were shown to be particularly useful, delivering important information about task switching, task and document management of information workers.

However, any HCI researcher knows the pitfalls of qualitative methods and their application in situ. The enormous time and resource demand combined with relatively small samples make qualitative field studies inefficient. Researchers have to rely on a participant's

ability to self-report (e.g. during interviews or critical incident collection) or on his or her self-discipline (e.g. when using diaries or cultural probes). Alternatively, methods such as participatory or video observations are less subject-dependent but prone to interpretation errors and observer bias. Moreover, the resulting collection of qualitative data is usually large and unstructured, making data analysis time and resource demanding.

In this paper a method of field data collection is introduced that, while preserving the advantages of other field methods, is more efficient than traditional interview and diary techniques. The method delivers pre-structured data, making the results easier to analyze, while still allowing participants to express themselves freely. The method was used as a structured, semi-ethnographic interview, with pictures from the desks of the participants as stimuli. This allowed preserving the context of the participants' environments while standardizing the interviewing conditions to ensure robustness and generalizability of the study.

In the following sections we introduce the origin of the triad elicitation method, explain the methodology, and describe the study that was performed with it.

## ORIGIN AND APPLICATION OF THE METHOD

Triad elicitation was initially introduced as part of the Repertory Grid Technique (RGT). RGT is based on the theory of personal constructs developed by Kelly [10].

### Personal constructs theory

Personal constructs theory assumes that people develop sets of dichotomous oppositions or *constructs* to represent their view on the world. These constructs (e.g., black-white, good-bad) establish a *personal construct system*, an overall individual theory about the world. This system lies behind the judgments and decisions that a person makes in different situations. The personal construct system is flexible so the constructs change depending on the context they belong to. For example, *black-white* is a common binary opposition; however, within the context of cars, *black-red* is a more probable opposition.

A construct system of an individual is a complex network of hierarchically linked sets of constructs. When forced to verbalize a construct a person produces a *verbal label* of the

construct that is an expression of a more abstract meaning. Verbal labels of constructs are therefore a small piece of a larger personal construct system and should be viewed within their context.

### The repertory grid technique

RGT was developed to reveal parts of a personal construct system. Fransella [5] views the grid as a kind of structured interview that “...formalizes the process and assigns mathematical values to the relationships between a person’s constructs” [p. 4]. The technique consists of two parts: construct elicitation and grid rating.

#### Construct elicitation

There are numerous techniques to elicit constructs, however, in this paper we will concentrate on the use of *triad elicitation* [5]. In its classical form participants are asked to list the names of 10 significant people in their lives (e.g., family members, or friends) on cards. Three randomly selected cards are then presented to the participant, asking him or her to choose two of them that are in some important way similar to each other and different from the third one. The participant is then asked to describe what makes the two similar and what makes the third one different. The similarity description forms the *left pole* of the construct whereas the difference statement is treated as the *right pole*. Elicitation then continues with a different set of cards.

#### Grid rating

At the end of the elicitation procedure, a set of constructs describing the participant’s view on personalities is produced. The participant is then asked to rate each of the 10 persons on the cards on each construct as being closer to the left or to the right pole (e.g., on a scale from 1 to 5, where 1 is the left pole and 5 is the right pole). These ratings form the repertory grid whose analysis reveals the participant’s “personality map”.

RGT based on triad elicitation has been widely used, for example, in consumer psychology [12] and market research [11]. It is also becoming popular in HCI [7], for example, for modeling users’ perception of system design [9]. This is though to our knowledge the first use of triad elicitation as a substantive explorative semi-ethnographic data collection technique.

As mentioned previously, we are discussing triad elicitation as a data collection method. In the remainder of this paper we will therefore focus on elicitation and omit grid rating.

### STUDY AND METHODOLOGY

Triad elicitation was used as part of a research project on supporting the document management of information workers. During the project other ethnographic techniques were used, such as contextual interviews [2] and in-situ observations [3]. These studies suggested a strong connection between document and task management. In

particular, we found that people extensively manipulate their paper documents when they are switching between tasks.

These studies concluded that people use implicit visual cues to recover the state of their interrupted or postponed tasks. Manipulation of paper documents during a task switch changes available cues adjusting them to represent the current state of the task. For example, placing a document next to the keyboard signals that one wants to continue working on it. The aim of our next study was to elicit these cues and to link them to task properties.

### Methodology and participants

Twelve information workers (6 male and 6 female, from various companies and institutions) participated in the study. Participants varied significantly in their age, background, and work responsibilities.

#### Data collection.

Each participant was visited twice at her workplace, in two consecutive weeks. During the first visit all objects on the desk were photographed from five angles: an overview (full desk view), individual objects in their context, from the participant’s viewpoint, from above, and zoomed in (readable view). The pictures were analyzed in detail for the present objects and during the second visit only the changes were pictured following the same protocol. For each participant, 25 triads were generated by randomly selecting 3 pictures for each triad from the whole set. Pictures of the same object were not combined into the same triad.

#### Elicitation interview

Participants were invited for the elicitation interview in a quiet and empty room. The interviews lasted from 1.5 to 2 hours, including a short break. Participants were first introduced to the elicitation technique and taken through a small trial.

Participants were exposed to a triad and asked to choose from the pictured objects two that were in some way similar and different from the third. The pictures were then rearranged into similar (left) and dissimilar (right) poles. The initial construct was recorded by the experimenter and placed to the left and right poles (see Fig. 2). Next, the initial construct was ladderized down by asking “How do you know that this is [left pole] whereas that is [right pole]” or “What makes you think that this is [left pole] whereas that is [right pole]” and ladderized up by asking “What does it mean for you that this is [left pole] whereas that is [right pole]” or “What are the consequences for you of the fact that this is [left pole] whereas that is [right pole]”. The emerging constructs were recorded and ladderized again until the participant would not be able to produce new constructs. The next triad was then introduced. The order of ladderizing was varied with each triad.



**Figure 1. Elicitation interview**

## RESULTS

In total 1280 pictures were collected, with 277 objects on them. The participants worked through 174 triads producing 638 constructs. Of these, 178 were initially produced, 242 were produced by laddering down, and 218 by laddering up. On average, participants were able to ladder the same number of steps up and down (1.21 vs. 1.36,  $t=-1.777$ , sig. 2-tailed=.103). More details are shown in Table 1.

### Visual attributes and task properties

The results of this study are still being analyzed. It is clear, however, that the goal of this stage – eliciting visual attributes and associated task properties – has been met. Of all constructs produced during the elicitation interviews, 89.5% (571 out of 638) were categorized as either visual attributes or task properties by 2 independent coders (agreement over 90%). On average only 10.4% percent of the constructs produced by a participant could not be classified ( $SD=4.6$ ).

The visual attributes category was subdivided into 13 primary and 6 secondary subcategories describing particular attributes (e.g. color, location, or group arrangement). Of the constructs categorized as attributes, 93.2% (262 out of 281) were categorized into one or more of these subcategories by 2 independent coders (agreement > 85%). The task properties category was subdivided into 14 subcategories describing various properties (e.g. importance, task status) and affordances (e.g. interaction possibilities). Of the constructs categorized as properties, 84.8% (201 out of 237) were categorized into one or more

		Total	Average pp	Min pp	Max pp	Std
Pictures collected		1280	106.7	47	140	23.9
Objects on pictures		277	23.1	9	32	6.2
Triads worked		174	14.5	9	19	2.8
Constructs produced		638	53.2	31	71	10.7
Laddered	Initial	178	14.8	9	19	3.1
	Down	242	20.2	13	30	5.4
	Up	218	18.5	9	26	4.4

**Table 1. Data collection results**

of these subcategories by 2 independent coders (agreement > 90%). All subcategories were ensured to be subject and environment independent. At the moment we are working on the relationships within and between categories.

### Laddering

Laddering of the initial construct was used to extend the data and assure that attributes and associated properties are elicited during interviews. Laddering proved to be very useful: out of 638 constructs, 27.9% were produced from the initial comparison, 37.9% from laddering down, and 34.2% from laddering up. In other words, 72.1% of all data was received from laddering.

We expected that participants would come up with constructs describing visual attributes when laddering down whereas they would come up with constructs describing task properties when laddering up. Data analysis verified this: 71.21% of all constructs produced from laddering down were attributes whereas 67.69% of all constructs produced from laddering up were properties (see Fig. 2).

## DISCUSSION

The major advantage of triad elicitation as a data collection technique is that it produces well-structured data which is much easier to analyze compared to unstructured interviews or explorative observations. It does not however restrict the

Laddering level	Construct	Category / subcategory
Up2	With this I have to work / Mostly the work is finished	Properties / Status of the task
Up1	This is probably raw data / This is a report or an article	Not categorized
Root	It is handwriting / It is typed text	Attributes/ Printed or handwritten content
Down1	The lines are not straight, are curved, it is irregular in size / The size is more regular, it is very neat, it is more straight line	Attributes/ Shape of the content

**Table 2. A group of categorized statements laddered from the same stimuli**

participants in how they can respond, as questionnaires or other structured interviews do. The participants were free to produce an initial construct the way they wanted. Triadic comparison judgment in combination with laddering has helped to discover visual attributes and task properties that were not revealed in previous research.

### Disadvantages of the method

A skilled interviewer and high commitment from the participants are essential, partly because of the time needed and partly due to the concentration required during the elicitation process. Several participants complained about laddering down as being exhaustive because it concerned “obvious” things that people normally do not consider. For instance, when answering the question “How do you know that these are handwritten whereas this is printed?” some would say “I just see it” whereas others were able to describe subtle differences such as the curviness and irregularity of handwritten text versus the straight, uniform lines of printed text. However, this was also an indication that we were indeed inquiring into the highly implicit concepts. The interviewer should be constantly alert not to let participant to deviate from the format of the interview.

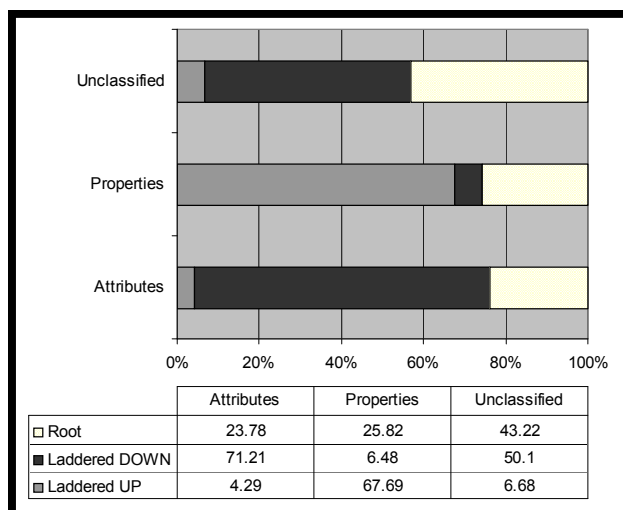


Figure 2. Attributes and properties coming from original constructs, laddering down, and laddering up (%).

### FUTURE WORK

Data analysis is still ongoing. We are currently tracing the links between constructs laddered on the same stimuli to reveal the connections between visual attributes and task properties (see Table 2 for an example). As a result, a model of the relationships between the visual attributes of the objects on peoples' desks and the associated task properties will be produced. It will provide invaluable information for designing systems that support personal information management and task switching.

### CONCLUSION

Triad elicitation, one of the elicitation techniques used within RGT, can be successfully used as an explorative in-

situ data collection technique. It delivers rich, well-structured, and easy-to-analyze qualitative field data. In contrast to other structured interview methods, it allows participants to express themselves freely. We applied triad elicitation to elicit visual attributes of objects that people perceive on their desks and related task properties. Extended triad elicitation with laddering has been especially fruitful.

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