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Terminological modelling of processes: an experiment

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0. Abstract

The article discusses modelling and describing processes with the help of different types of concept relations. The study is part of an ongoing project where terminological concept analysis methods are being developed to accommodate needs of specialists. The example taken here is the Japanese tea ceremony and the material consists of observations of the actual process and of descriptions in literature. In terminology work normally only the established concepts are regarded as relevant, while here the whole process is being modelled. Concept relations that proved to be productive in the analysis were contiguity relations, activity relations, relations of origin, instrumental relations, and transmission relations, as well as several of their subtypes.

Keywords: concept, concept relation, modelling, tea ceremony

1. Introduction

This article reports results from a pilot study where concept relations were used to model and describe a process. Terminological modelling refers here to concept analysis performed by using different terminological methods and theoretical "tools" (e.g. concept, characteristic, concept relation, concept system). Modelling tools in this study consist of a selection of concept relations from a concept relation typology developed in my earlier work (Nuopponen 1995, 2005) and some additional relation types as well as a mind mapping technique resembling the "satellite method" (cf. Nuopponen 1998). As the object for modelling, the Japanese tea ceremony (in Japanese *chadô*, *sadô* "the way of tea", or *cha no yu* "hot water for tea") was used. The information sources consisted of an introductory course that I participated in, and an introductory book on *chadô* by Sen Soshitsu, the 15th grand master of the Urasenke lineage of tea.

The purpose of the study was to test and improve the applicability of the concept relation typology presented in appendix 1, especially when applied to modelling a process. In references to nodes in the typology in the appendix, corresponding numbers will be used. The typology is a theoretical construct intended to cover as many different empirical cases as possible, but shortcomings in the typology are found whenever authentic material is analysed. The typology was created with terminology work in mind, but in this study the typology was used to conceptually model a whole process instead of only concentrating on the established concepts as it is usual in terminology work. Thus in addition to terms of established concepts, other expressions for concepts and concept characteristics as well as statements of facts appear in the graphical representations.

For a terminologist looking for concepts and terms most of the process description may be uninteresting, while for various other information specialists (e.g. technical writers, information system designers) detailed process mapping is necessary. They need more or less precise descriptions on the different steps in a process, e.g. who does what and why. The terminologist will be satisfied with a more generalized and fuzzy idea of the individual steps if these are not conceptually fixed and provided with a term. However, also a terminologist must sometimes map the processes in her or his subject field when looking for accurate information on concepts; and not only on concepts referring to the distinguishable phases of a process but also to other elements involved in a process (e.g. *actor*, *object*, *result*). Process mapping is needed for defining dynamic concepts (i.e. domain specific actions and events), as can be concluded from Pilke (2000), where definitions and terms used for dynamic concepts were analysed.

2. Concept relations

In my earlier work (Nuopponen 1994) I distinguished between relationships observed between entities, i.e. ontical relation, and concept relations in accordance with Eugen Wüster (1974: 95). I also followed his division of concept relations into either logical [concept] relations (syn. generic relations e.g. *flower* – *rose*) based on logical reasoning and abstraction process, or ontological [concept] relations (e.g. *flower* –

stalk, bud – flower, flower – seed) based on the ontical relations. Where the line between ontical and ontological relations is drawn is not always easy to determine, especially when abstract phenomena are concerned. In many cases for instance, partitioning of objects and distinguishing among phases of processes are activities that are done only on the conceptual level. In the physical world there may not even be any retraceable partition of a certain entity. The same goes for processes. Instead the partition or phase division is often based on our assumptions and attempts to create order and neat conceptual packages for our specific communication or activity purposes. Especially in scientific research, different alternatives for conceptual structuring for the same slice of world appear.

As mentioned earlier, terminologists do not, however, typically need as thorough an analysis as information specialists do, nor as I needed in order to learn the tea ceremony procedure. Both ontical relations and concept relations, especially different types of ontological concept relations, were involved in this modelling enterprise. Ontical relations between actions and different factors were observed when the procedure was repeated several times. These relations were generalised as ontological relations when learning the process and making notes on it as well as later on drawing a graphic presentation for it. The most useful relations were those that I classify as temporal, activity and transmission relations (see the following nodes in appendix 1: 2.1.8, 2.2.3.1 and 2.2.4).

3. Process, procedure and ceremony

Typically a process can be seen as a whole consisting of a series of actions or operations, and having a start and a finish. Wikipedia adds more characteristics to this:

a naturally occurring or designed sequence of operations or events, possibly taking up time, space, expertise or other resource, which produces some outcome. A process may be identified by the changes it creates in the properties of one or more objects under its influence.¹

There are many types of processes, but I concentrate here on a process that consists of a designed sequence of operations. It has a clearly distinguishable start and finish, and it requires expertise, resources and tools as well as time and location. Changes in the properties of some objects can be identified and an outcome is produced. Certain processes can be often realised through different types of *procedures*, i.e. series of steps followed in a regular definite order,² depending on several factors. For instance, the process of washing clothes varies according to the programme selected, which in its turn is determined by the type of clothes we are washing.

The object for modelling, the Japanese tea ceremony, *chadô*, requires adding yet another process concept: *ceremony*. A ceremony could be defined as "an oft-repeated action or series of actions performed in accordance with tradition or a set of rules" or "prescribed procedures".³ Thus, a ceremony could be said to be a designed process realised with certain procedures. I shall concentrate here only on this procedural side of the tea ceremony and treat *tea gathering* as the central process concept.

4. Tea ceremony – chadô

The English term 'tea ceremony' refers to a process while the underlying concept is wider, as the Japanese term *chadô* suggests. It covers not only the act of tea making and drinking, but e.g. also spiritual, philosophical and aesthetic dimensions, as well as the institutional foundations, e.g. tea schools and tea traditions. Some authors compare *chadô* – the way of tea – to a religion, "a religion of aestheticism – Teatism" (Okakura 2000: 18), "a household sacrament of aesthetics, economics and etiquette" (Sadler 1933/1998: vii), others to an art: "Art of Living",⁴ "an art of everyday life" (Murai 1998: 13), "art form based on the act of tea drinking" (*ibid.*: 12). According to Murai (1998: 29–30) it could be called even "a composite art", because its evolution involves also "various arts and crafts, such as painting, calligraphy, landscape gardening, and architecture" as well, the development of which has been intimately related to *chadô* in Japan.

Tea ceremony is realised in different types of tea gatherings according to number of guests, time of year, utensils to be used, if food is served or not, etc. The type of

gathering prescribes the type of procedures (*temae*) to be used. The literature in the field does not necessarily delimit these concepts (tea ceremony/*chadô/cha no yu*), tea gathering and procedure (*temae*) explicitly from each other, nor use the terms in the same way I do here. This conceptual and terminological vagueness depends on many factors, which need more specialised knowledge than what I have as a beginner at the moment. In this case – as in so many other concept analysis efforts – the most central concepts seem to be evasive and it is difficult to give a precise definition. In general, field specialists do not even seem to be worried about their fuzzy edged concepts and term variation. Actually, in developing disciplines this fact seems to be feeding innovative thinking, alternative views, and discussions, e.g. the concept of *concept* in Terminology Science. *Chadô* is an opposite case, its procedures are highly standardised. The first tea rules were established in the mid-fourteenth century (Murai 1998: 12). The great tea master, Sen no Rikyu (1522–1591), refined the tea procedures. Later on, new procedures were created and different schools of tea have developed some traditions of their own. I follow here the Urasenke tradition.⁵

I concentrate on a tea procedure (*temae*) called *bon ryaku demae*⁶ (syn. *ryaku bon no temae*, *bon ryaku date*; here: *bon ryaku procedure*), i.e. a procedure where a special type of round tray (here: *ryaku* tray; *bon* "tray") is used by the host to carry the tea utensils (*chadôgu*). This procedure is one of the least complicated ones and thus among the first ones to be taught to tea students. (Jitsuyo chadô yôgo jiten 1993: 335.)

A tea gathering where *bon ryaku* procedure is used starts with pre-preparations before the guests (*kyaku*) arrive. The host (*teishu*) cleans the tea-room (*chashitsu*), *tatami* mat and the utensils (*chadôgu*) to be used, sills the powdered tea (*maccha*), arranges flowers (*chabana*), selects a painting scroll (*kakemono*) for the alcove (*tokonoma*) and makes other preparations. When the guests arrive, *greetings* (*aisuchi*) are exchanged mutually. The guests admire the decorations in the *tokonoma* and sit on the *tatami* in a certain order. The host brings a tray (*higashi bon*) with *sweets* (*kashi*) in front of the main guest (*shôkyaku*). The host makes the *preparations*, bringing in the utensils on a tray (*ryaku bon*) and placing them on the *tatami*. The host then performs a ritual *purification* of the utensils with a silk cloth (*fukusa*) and a cotton cloth (*chakin*) before *preparing* a bowl of thin tea (*usucha*) to the main guest (*shôkyaku*). When all guests have had tea, and they do not want anymore, the host *cleans* the utensils. The main

guest may ask to *examine* (*haiken*) the utensils, and each guest in turn examines and admires them. After that, the host carries the utensils to the preparation room (*mizuya*), returns and everybody *thanks*, guests leave, and the host *cleans* the utensils and the tea room. (See e.g. Sen 2004: 80–101). Most of these steps appear in other types of tea gatherings, too.

Basically every single move in tea ceremony procedures has rules and a prescribed order. A tea student has to learn the "right way to do it". It proved to be difficult to memorise all the details in this highly standardised procedure when still on the very first beginners' level. It is only after the student has reached a higher level and masters the basic things without thinking that he or she can feel freer with the rules. It takes years of practice to reach that level. On the first levels there is written literature available describing the procedures, but at higher levels, as in all traditional Japanese "*dô*" (e.g. *judô*, *aikidô*), secret knowledge is transmitted orally from the master to the apprentice, or by reading secret texts under the supervision of the master. On the higher levels no notes can be taken during the classes. As a beginner I wrote down every move and action in order to memorise and practice at home. In addition I used a Japanese book with photo illustrations and explanations. However, the notes from the classes were not detailed enough, nor were the series of photos or their explanations. Movements and actions are difficult to illustrate graphically and need accompanying texts. To make the notes more accurate I started to apply terminological methods and concept relation classification created in my earlier research work, and created a description system to model the procedure with the tiniest details. This modelling process gave new ideas for the classification. In the following, the relations which were needed for modelling the procedure are presented and illustrated with examples from the procedure. The final detailed map for the whole process is not given here because already a rough version of it is at least five pages long.

5. Temporal and agent relations

Temporal relations (see appendix 1: 2.1.8) and temporal concept systems are often mentioned in terminological literature but they are seldom analysed further.⁷ Authors use the term 'temporal relation' for two different types of relations: those that are based on relations between phases in a process (e.g. Arntz & Picht 1989: 99) or

entities that follow each other (e.g. popes or kings) (Wüster 1974: 94). I have combined both of these in my typology as types of temporal relations: *event relation* (e.g. relations between phases in a process; 2.1.8.1) and *succession relation* (e.g. relations between instruments used in a process; 2.1.8.2). 'Event relation' category has been used to refer to relations between phases in both *events* and *actions*, even though it would be useful to distinguish between these two types, after all events and actions are different types of phenomena, as Pilke (2000) shows in her dissertation on dynamic concepts. Instead of the term 'event relation' a better alternative would be thus '*phase relation*', because both actions and events can have phases. As to processes, they may have both of these as their phases.

Pilke (2000: 321) points out that events and actions cannot be separated entirely from each other, because "events lead actions and actions lead to events". In my typology, relations between concepts that refer to events and factors that cause them belong to *causal relations* (2.2.1), and accordingly, actions of causal agents are regarded as "producing causes" (cf. Nuopponen 1994a). Processes contain causal components and causal relations are thus important in modelling processes, but in my present material they are not as relevant as in many other cases.

Temporal phase relations form the backbone for the *bon ryaku* procedure. Simplified, the major phases of a tea gathering in this case could be the following actions: pre-preparations, greetings, preparations, purification of the utensils, serving/eating sweets, making/drinking tea, cleaning/examining/carrying away the utensils, thanking and cleaning (see figure 1). This division is based on my own effort to differentiate actions from each other. As I have not yet found established designations for all the actions I have used descriptions to name the phases.

In terminology work it is usual to distinguish between *consecutive* (2.1.8.4) and *simultaneous* (2.1.8.3) temporal relations. This division applies to all types of temporal relations discussed above. A problem encountered when describing a process is that many phases may be repeated and they overlap or intertwine with each other, etc. Most of the phases in my material are sequentially related, while some of them are simultaneous, partly simultaneous, or overlap, especially if we look at the actions taken by different agents. For instance, each of the guests eats the sweets

while his/her bowl of tea is being prepared. For the purposes of learning and performing a process, it is important to show exactly the relationships between the different actions, but for terminological purposes a more general description is sufficient.

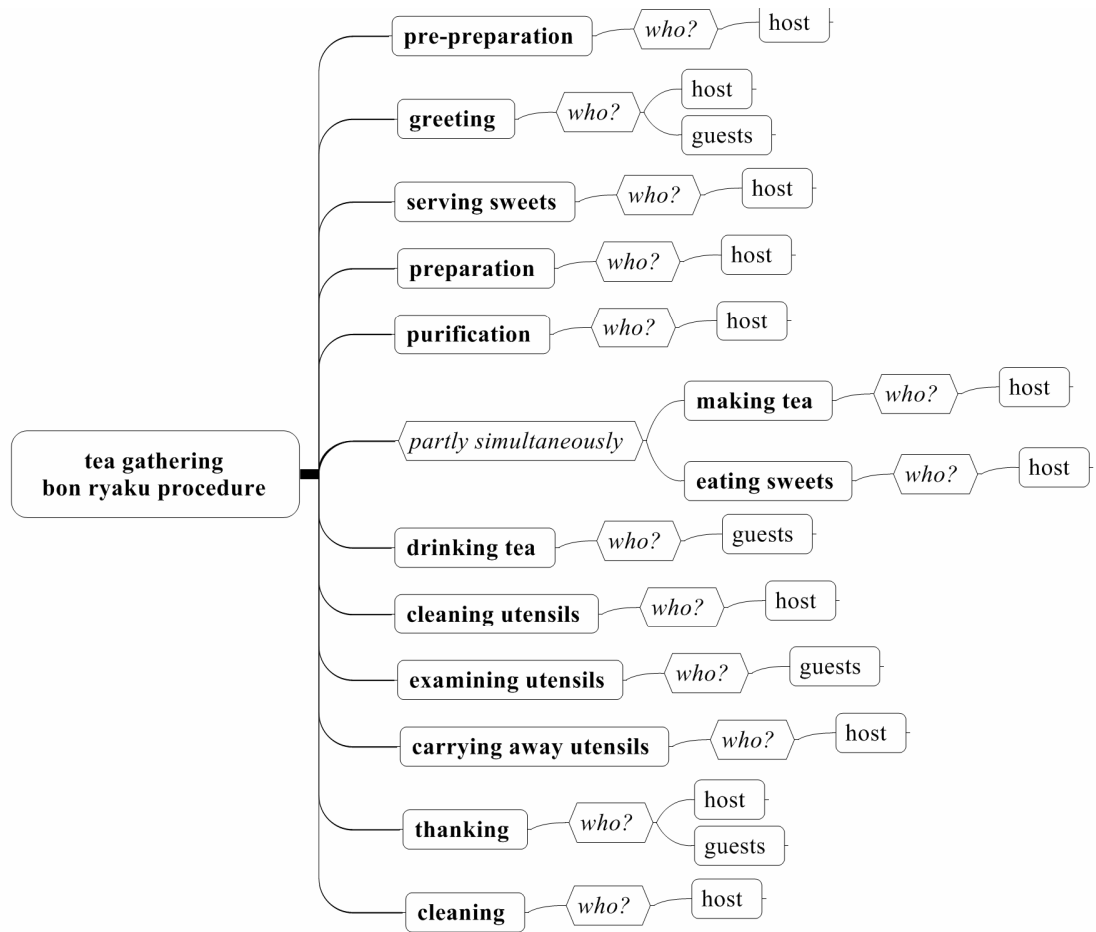


Figure 1. Phases and participants of a tea gathering in bon ryaku procedure

Actions involve human agents (see Pilke 2000: 319), in this case a host (*teishu*) and one or more guests (*kyaku*) (see Fig. 1). To describe who does what I use *agent relation* (2.2.3.1.1), i.e. a relation between concepts that refer to an action or an activity and an agent or an actor that is performing it. In Figure 1 they are marked with "who?"

6. Object, instrumental, teleological, resultative and locational relations

In addition to an actor, quite often an *object* is involved in the action or activity, e.g. the host is carrying a tray or lifting a tea bowl, the guest is drinking tea or saying "Dômo arigatô gozaimashita". I classify this relation based on action and its object as *object relation* (2.2.3.1.2). In Figure 2 the object relation is marked with the marker "what?", e.g. *purification - natsume*.

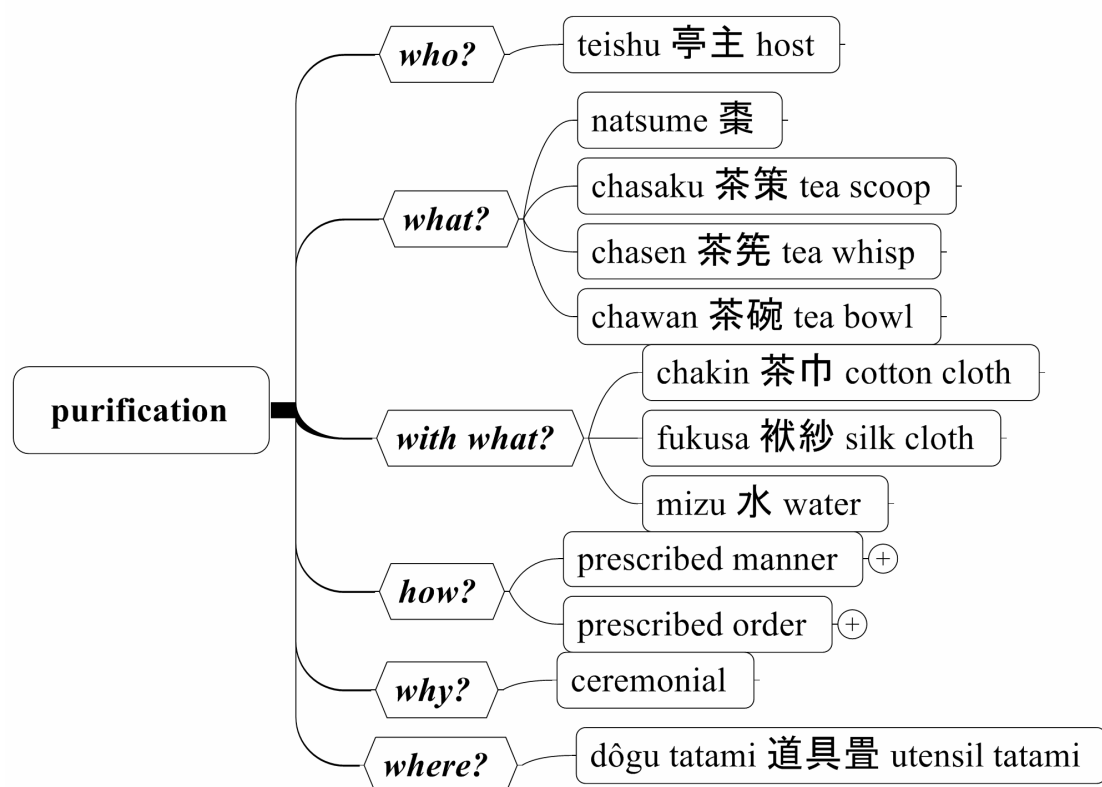


Figure 2. Purification of the tea utensils

Furthermore, *instrumental relations* (2.2.3.3; "with what?") are involved, because actions of activities are often performed with different types of **tools** (**tool relation** 2.2.3.1.3), e.g. in Figure 2 purification is done either with a cotton cloth, a silk cloth or with water. I have thus classified also a **material** used in purification (water) as a "tool", because its role is instrumental. In the process of making tea the host uses a tea whisk and some other utensils as tools, while in that phase water has a function as an ingredient (*ingredient relation*: product-ingredient 2.2.3.2.4). As a third type of instrumental relation I have classified those relations that refer to the relationship between the action and the method, way, or procedure used to perform an activity or

an action as instrumental relations (*how?*). Further examples of this *action-method* relation are: making tea – *seiza* (formal kneeling posture); and wiping the inside of *chawan* (tea bowl) – movement in form of the Japanese *hiragana* sign *i* [い]. This relation type – *manner relation* – can be distinguished as a subtype of instrumental relations.

Actions also have purposes ("*why?*"; *teleological relation* 2.2.3.1.6), e.g. purification of the utensils in front of the guests is done for ceremonial purposes, because they have been washed and cleaned after the previous tea gathering as well as before the guests arrive. Figure 3 summarises the relations in the preceding two sections.

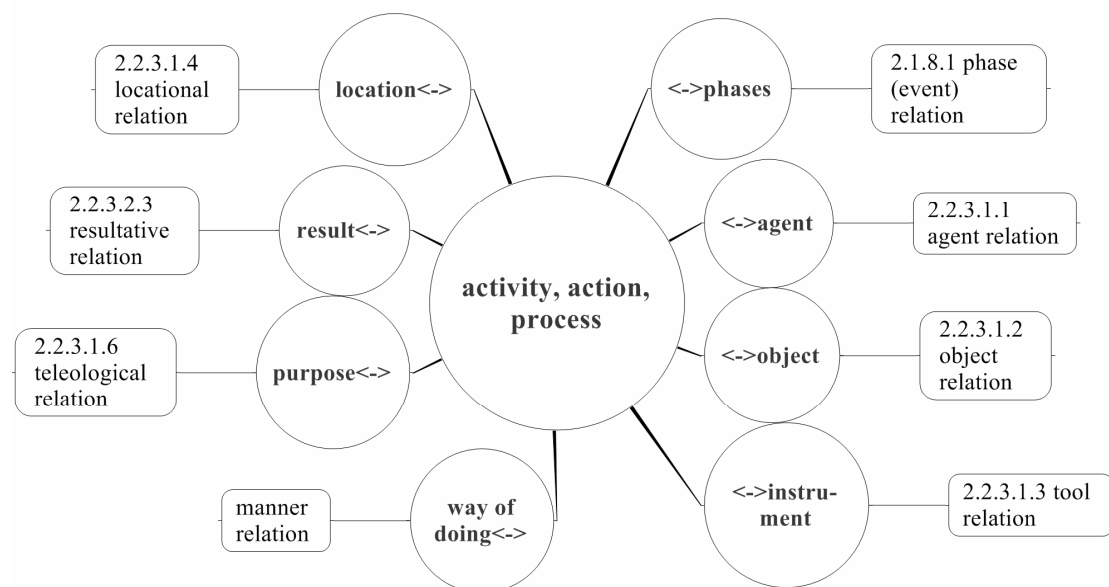


Figure 3. Summary of the relations in sections 5-6

The procedure for making tea results in a bowl of tea; in the case of *bon ryaku* procedure the result is a bowl of *usucha*, "thin tea". The concept relationship based on the association between an activity and its result is *resultative relation* (2.2.3.2.3). There are several relations involving location (see appendix 1), but what is needed here is the relation between the activity and the place of the activity, *locational relation* ("*where?*"; 2.2.3.1.4), e.g. *purification* - *dôgu tatami* (utensil tatami), *tea gathering* - *chashitsu* (tea room), *pre-preparation* - *mizuya* (preparation room).

7. Transmission relations

The approach taken in Figure 2 to analyse one main phase of a tea gathering could be sufficient for terminology work. It is still a very rough presentation of this phase of the process and does not describe the subprocesses involved. If we need a more precise picture of the phase, we need to look closer at the purification of each of the utensils. The purification process has several phases according to which utensils are purified as shown in Figure 4.

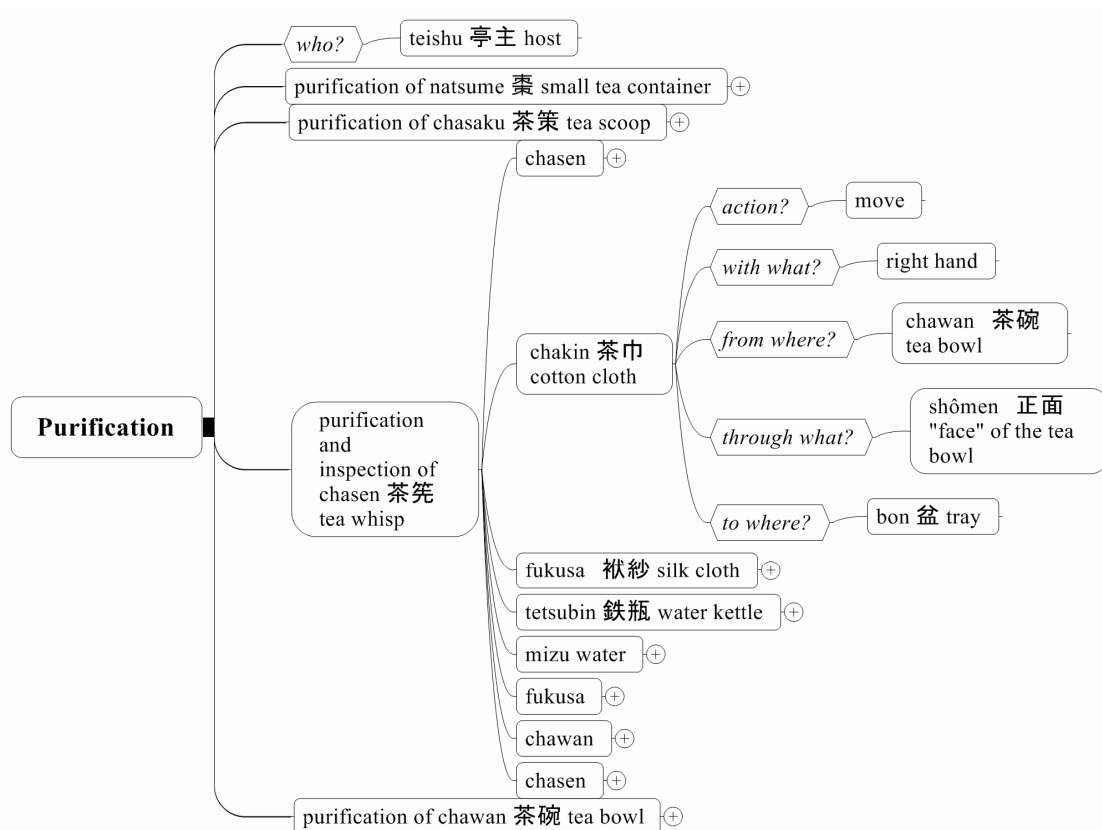


Figure 4. Purification process with a detailed analysis

Each phase of the purification consists of several actions which each have an object. Instead of focusing on actions like in Figures 1 and 2, here the *objects* have been taken as the primary nodes to represent the different steps to be taken. Purification of each of the objects involves several further aspects as is shown in the Figure 4, where the phase of *purification and inspection of the tea whisk* is expanded further. Several utensils and water are handled during this phase and each of them involves a certain procedure, as illustrated under the node *chakin* in Figure 4: *chakin* (cotton cloth) is moved with right hand from the tea bowl to the tray over the "face" of the tea bowl.

On this level of detail, relations can be seen to be more object-centred than activity-centred. The *chadô* learner also tries to memorise which utensils follow each other (e.g. *natsume* - *chasaku* - etc.; *succession relation*; 2.1.8.2).

From the list of relations presented earlier, object relation (*move* - *chakin*) and tool relation (*move* - *right hand*) can be found. An additional instrumental relation appears here: *tool-object transmission relation* (2.2.4.1.5), *chakin* - *right hand*. Also other *transmission relations* (2.2.4.1) become useful, especially those that involve direction. The concepts in *source relations* (2.2.4.1.3) refer to an object and its sender or place of departure (*chakin* - *chawan*) while *target relations* (2.2.4.1.4) are based on the relationship between an object and its receiver or destination (*chakin* - *bon*). In addition to these, Figure 4 also has a relation marked "*through what?*" expressing the route, i.e. one or more waypoints that define the path to be taken (*chakin* - *shômen*).⁸ *Shômen* is the side of the tea bowl, which is selected as its "face" or front side. It often has a decoration or some kind of mark. The *chakin* is not lifted directly from the *chawan* over its edge and placed on the tray to the right of the bowl, but over the *shômen*, i.e. towards the host, and then placed on the tray. In my classification I have had *intermediary relations* (2.2.4.1.3.4: *object* -> *intermediary*; 2.2.4.1.3.2: *intermediary* -> *object*), 'intermediary' being defined as someone/something delivering an object from the sender to the receiver. This category does not, however, apply here, because intermediary is rather a type of an agent. The new transmission relation type could be called *route relation* (*object* - *route*). Another example from the tea gathering is *guest* (*kyaku*) - *guest door* (*nigiriguchi*) in cases when the gathering is held in a traditional tea house.

8. Discussion

The purpose of the pilot study was to test an earlier typology of concept relations (appendix 1) and enhance it. In the typology, process related relations are separated from each other; this is a decision that is necessary in the context of classification and defining. However, when we work with temporal or other process related concept systems in practice, there is no need to keep these relations apart. A combination of several relation types presented in Nuopponen 1994 has been tested and further

developed in a Swedish data modelling project for patient information system (see Hedin et al. 2000). This paper gives another example.

Figure 5 sums up those relations that I used in modelling a tea gathering using *bon ryaku* procedure. New relation types are indicated in italics and are without a number. The typology in appendix 1 is used here as a basis and numbering remains the same even though the relation types are grouped in a different way.

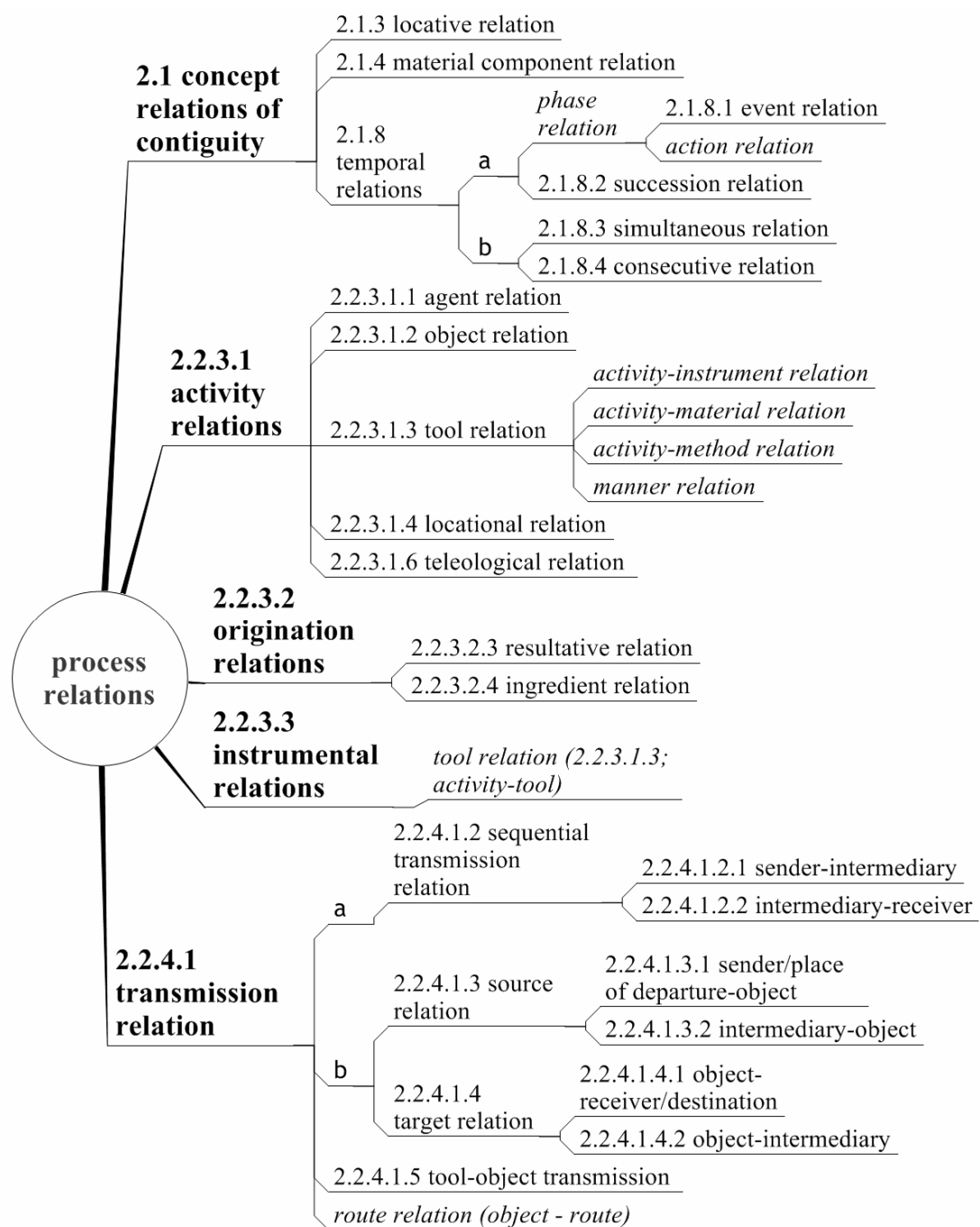


Figure 5. Summary of types of relations needed for modelling *bon ryaku* procedure

This process-centred typology reflects only those relations needed for modelling the material, which represents only one type of process. In addition, several other relation types could be found in the material, but the selected ones were enough to model the procedure fairly well. In some subphases a more thorough analysis is still needed and some new relation types may be needed. In this pilot study, however, I started from a simple process that does not have too many vague points or alternatives, nor involve too many relation types. In this way a foundation could be established for a further study of more complicated processes.

Generic and partitive concept relations were not needed either in this case, but they will be needed when analysing *chadô* concepts and terminology further. This article is a part of my ongoing project where terminological concept analysis methods are being developed to accommodate needs of different specialist groups, e.g. terminologists, technical writers, information designers and researchers.

As to the product of process mapping of the tea ceremony procedure, a detailed process map is not sufficient to guide a person who has never participated in a *chadô* class to perform the procedures right. In addition, visual demonstrations and lengthy descriptions would be needed. Anyhow, it proved to be a helpful support for practicing the procedure at home. This was an experiment to apply terminological methods and concept relation analysis in order to model a whole process as detailed as possible. Later on, other types of processes will be explored, because not all processes are as standardised as the *chadô* procedures; other processes involve several alternative actions, causal connections, simultaneous and overlapping actions and events and thus pose greater challenges for modelling.

Notes

- ¹ Wikipedia: <http://en.wikipedia.org/wiki/Process>
- ² Merriam-Webster OnLine Dictionary and Thesaurus: <http://www.webster.com>
- ³ Merriam-Webster OnLine Dictionary and Thesaurus: <http://www.webster.com>
- ⁴ Urasenke Konnichian: <http://www.urasenke.or.jp/texte/chado/chado1.html>
- ⁵ See Urasenke Konnichian: <http://www.urasenke.or.jp/texte/index.html>
- ⁶ Sen 2004: 80-101.
- ⁷ Numbering after types of relations refers to appendix 1 which is based on the relation classification in Nuopponen 2005.
- ⁸ For the definition of *route*, see Map GPS Glossary: <http://www.maps-gps-info.com/maps-gps-glossary.html#R>

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Appendix 1. Classification of concept relations (Nuopponen 2005)

