PSYKHE
2004, Vol.13, Nº 1, 191-196

ISSN 0717-0297

Informe de Investigación

The Taxonomic Representation of Common Events: A Research Report

La Representación Taxonómica de Eventos Comunes: Un Informe de Investigación

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Shared cognitive representations have been shown in different conceptual domains. An experiment is presented here that extends this line of research to the domain of events. Specifically, this experiment shows a cultural consensus in the participants' event taxonomies, and suggests a shared event taxonomy based on semantic relations. Showing such a shared event representation is an important first step for learning about the role of events in cognitive processes such as memory and thought.

Las representaciones cognitivas compartidas han sido demostradas en diferentes dominios conceptuales. Se presenta aquí un experimento que extiende esta línea de investigación al dominio de los eventos. Específicamente, este experimento demuestra un consenso cultural en las taxonomías de eventos de los participantes y sugiere una taxonomía de eventos compartida basada en relaciones semánticas. Demostrar dicha representación de eventos compartida es un importante primer paso para aprender sobre el papel de los eventos en procesos cognitivos como la memoria y el pensamiento.

From a cognition perspective, culture consists of shared cognitive representations in the minds of individuals (Romney, Boyd, Moore, Batchelder, & Brazil, 1996). This perspective has been empirically supported in different conceptual domains including, for example, the domain of natural kinds (Atran, 1998). The research reported here extends this quest for cognitive universals to the domain of events. No study yet has tested if there actually is a shared event representation. The aim of this experiment is to do precisely that. Showing a shared event representation is essential for studying it's role in further cognitive processes.

Previous studies on event representation (Morris & Murphy, 1990; Rifkin, 1985) have first assumed that people have event taxonomies of three levels, namely, a basic level (e.g., "having breakfast"), a subordinate level (e.g., "having a Continental breakfast"), and a superordinate level (e.g., "having a meal"); and then shown that people prefer labeling events at the basic level as they do with objects (Rosch, Mervis, Gray, Johnsen, & Boyes-Braem, 1976). The present experiment first obtains event taxonomies from people themselves including their levels, dimensions, and clusters; and then tests if people have a shared taxonomy as they do with animals (López, Atran, Coley, Medin, & Smith, 1997). Moreover, the events themselves are restricted to common daily-life events obtained from people too. Any assumptions about event specificity are thus avoided.

The cultural consensus model (Romney, Weller, & Batchelder, 1986) is applied here to test for a shared event taxonomy. According to this model, members of the same culture share in their knowledge of the world. This shared knowledge amounts to a cultural consensus that manifests as agreement among members in a given conceptual domain such as folk biology. Statistically, the model is instantiated by a factor analysis of this agreement (see Method below). The experiment here tests for a possible cultural consensus in people's event taxonomies. Such a consensus would show a shared cognitive representation of events in the minds of individuals.

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This research was supported by the German Research Council (DFG).

Method

Participants and Materials

Twelve students at the University of Hamburg were paid to take part in this experiment, which was originally done in German. Thirty-eight typewritten cards (3.5 x 7 cms) were used to represent the events for the experiment. The number of participants and cards is equivalent to Lopez et al.'s (1997) animal taxonomies study.

Design and Procedure

This experiment had a single condition that tested for a possible cultural consensus in the participants' event taxonomies. These taxonomies were derived from the participants' sortings of event cards. The Appendix shows the translated English and original German expressions of the 38 events for the experiment. These events were provided by at least five of other 15 pilot participants asked to list 40 "common daily-life events." They include events like "working," "meeting friends," and "doing the laundry." The event specificity is equivalent to Rifkin's (1985) basic level events.

All participants were tested individually for about one hour in an university laboratory. First, the participants were told that this experiment had no further purpose than learning how people organize events, and that their task was thus simply sorting common daily-life events. Then, the event cards were aligned alphabetically in front of the participants, and they were asked to do a free sorting by building "groups of events that somehow go together." The nature and number of groups and members was hence up to the participants. Their groups were recorded, and the participants were asked to do an ascending sorting by uniting the groups into "supergroups of events that somehow go together." Their supergroups were recorded, and the ascending sorting was repeated until the participants indicated that no more supergroups were possible. Then, their initial groups were restored, and the participants were asked to do a descending sorting by separating the groups into "subgroups of events that somehow go closer together." Their subgroups were recorded, and the descending sorting was repeated until the participants indicated that no more subgroups were possible.

Results and Discussion

Event Taxonomies

An event taxonomy was derived for each participant by translating the groups she made in the sortings into a tree. Each node at the bottom of the tree corresponds to a separate event, and the node at the top of the tree corresponds to all events united. Each node at an intermediate level of the tree corresponds to a group of events from the sortings. These levels increase from the last descending sorting to the last ascending sorting. Nodes at the same level correspond to groups of events from the same sorting. Nodes at lower levels correspond to groups of events that go closer together.

Figure 1 depicts a participant's event taxonomy.

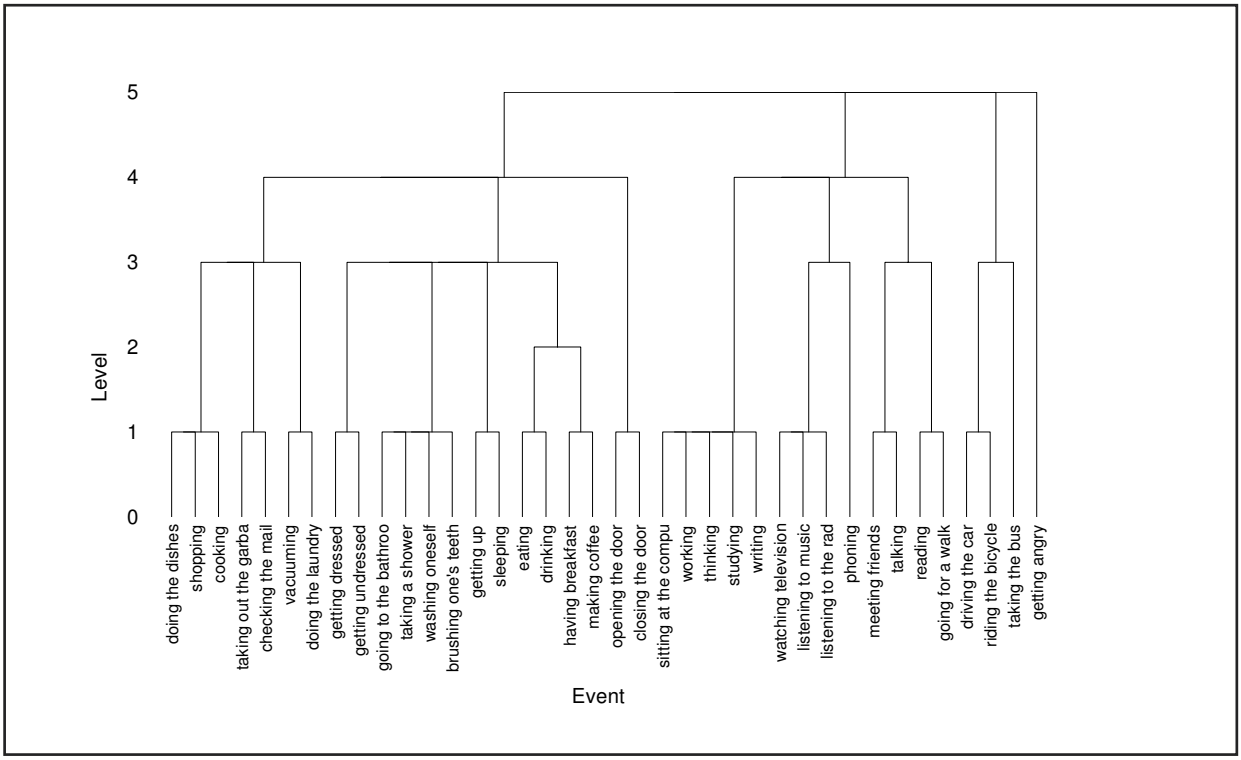

Figure 1. A participant's event taxonomy.

This taxonomy has six levels. Level 0 shows each of the 38 separate events such as "brushing one's teeth", and level 5 shows them all united into the class of common daily-life events. At level 1, these 38 events are sorted into 17 specific groups that can be assigned approximate labels based on most of their members. They include, for example, a group of media events ("watching television" to "listening to the radio"). These groups are further united at higher levels. By level 4, the 17 specific groups are sorted into just four subclass groups including, for example, a group of transport events ("driving the car" to "taking the bus").

A participant's event taxonomy may have up to 38 levels and 37 specific or subclass groups. However, the actual scope was limited to few levels and groups. Most taxonomies (5) had just six levels (range: 6-8) and three subclass groups (range: 3-6), and half (6) had less than 22 specific groups (range: 16-28). Moreover, a taxonomy may have groups of events based on different kinds of relations. But the actual membership was constrained to semantic relations. Among others, most taxonomies (7) had the same group of transport events ("driving the car" to "taking the bus"), for example. These findings suggest that the participants' event taxonomies were not idiosyncratic but tended to consent in the number and nature of groups and members.

Cultural Consensus

A distance matrix was derived from each event taxonomy by calculating the distance among the events. This distance corresponds to the lowest taxonomic level at which two events go together. For example, in the taxonomy above, "eating" and "drinking" go together at level 1, thus their distance is 1. Analogously, the distance between "eating" and "having breakfast" is 2, "eating" and "sleeping" is 3, "eating" and "vacuuming" is 4, and "eating" and "reading" is 5. There is no distance between an event and itself, thus the distance between "eating" and "eating" is 0. Low distance corresponds to high relatedness. Thus, in the taxonomy above, "eating" and "drinking" are highly related events, "eating" and "sleeping" are moderately related events, and "eating" and "reading" are lowly related events.

A principal components factor analysis was performed on the correlated distance matrices to test for a possible cultural consensus in the participants' event taxonomies. According to the cultural consensus model (Romney et al., 1986), a cultural consensus is indicated by a single factor solution in which (1) the first factor accounts for most of the variance, (2) the first factor eigenvalue is several times larger than the second, and (3) the first factor loadings are all positive. Results show that the factor analysis produced such a single factor solution. The first factor accounted for 51% of the variance (the second for 8%), the first factor eigenvalue was six times larger than the second (6.15 to .96), and the first factor loadings were all above .50. According to the model too, the cultural competence of an individual is indicated by her first factor loading. Loadings range from 0 to 1 with higher loadings indicating higher competence. Results show that the first factor loadings ranged from .52 to .87 with an average of .71. These findings indicate that there is a cultural consensus in the participants' event taxonomies, and that all participants are culturally competent at instantiating this consensus in their taxonomies. That is, these findings suggest that there is an event taxonomy shared by the participants.

Shared Taxonomy

A cluster analysis was performed on the averaged distance matrices to derive the shared event taxonomy. Figure 2 depicts this taxonomy. The shared event taxonomy has six levels. Level 5 shows the general class of common daily-life events, and level 0 shows its specific members such as "writing." At level 4, this class is divided in three subclass groups of roughly home ("doing the dishes" to "closing the door"), nonhome ("sitting at the computer" to "phoning") and emotion events ("getting angry"). These goups are further divided at lower levels. The group of home events includes, for example, groups of household ("doing the dishes" to "cooking"), wake-up ("getting dressed" to "sleeping") and food events ("eating" to "making coffee") at level 3; clean-up ("doing the dishes" to "doing the laundry") and hygiene events ("going to the bathroom" to "brushing one's teeth") at level 2; and cloth ("getting dressed," "getting undressed") and entrance events ("opening the door," "closing the door") at level 1. The group of nonhome events includes, for example, groups of work ("sitting at the computer" to "writing"), transport ("driving the car" to "riding the bicycle") and leisure events ("watching television" to "going for a walk") at level 3; and media events ("watching television" to "listening to the radio") at level 2.

The shared event taxonomy is also limited to six

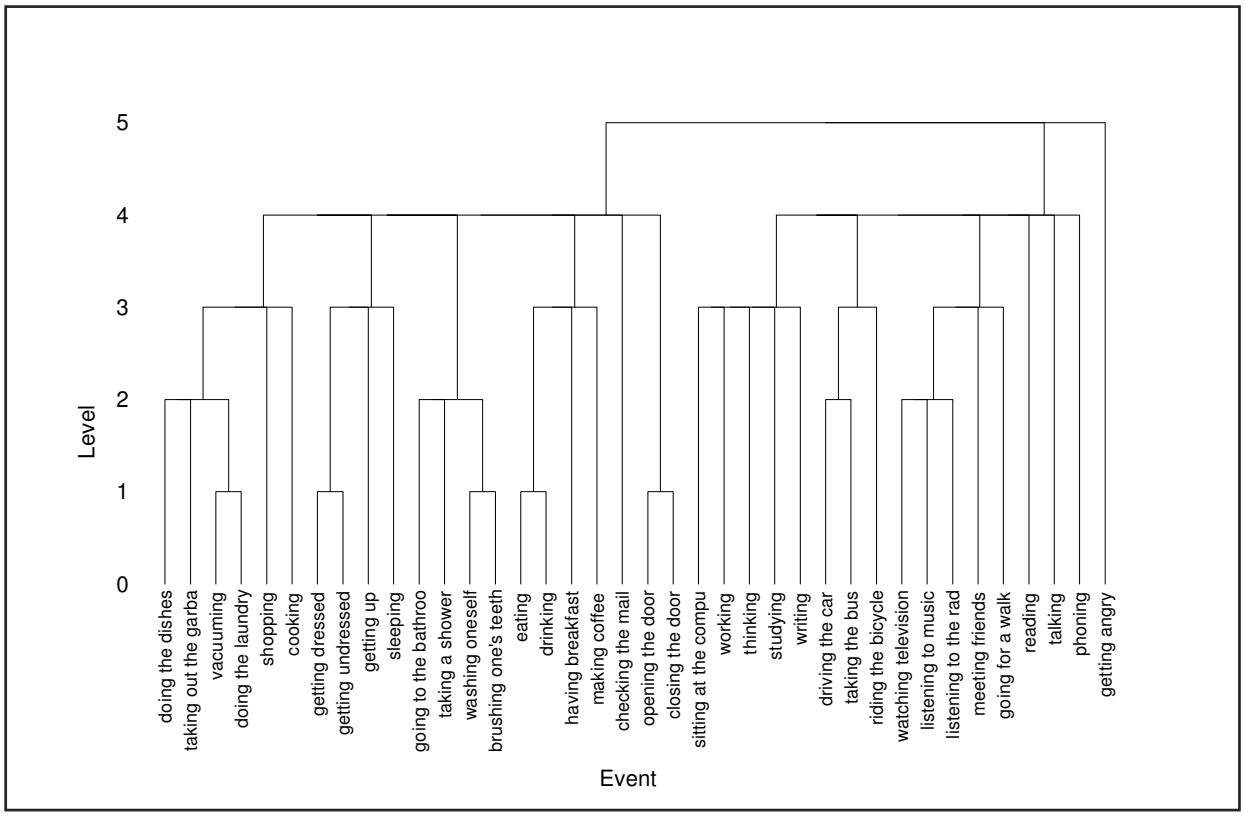

Figure 2. The shared event taxonomy.

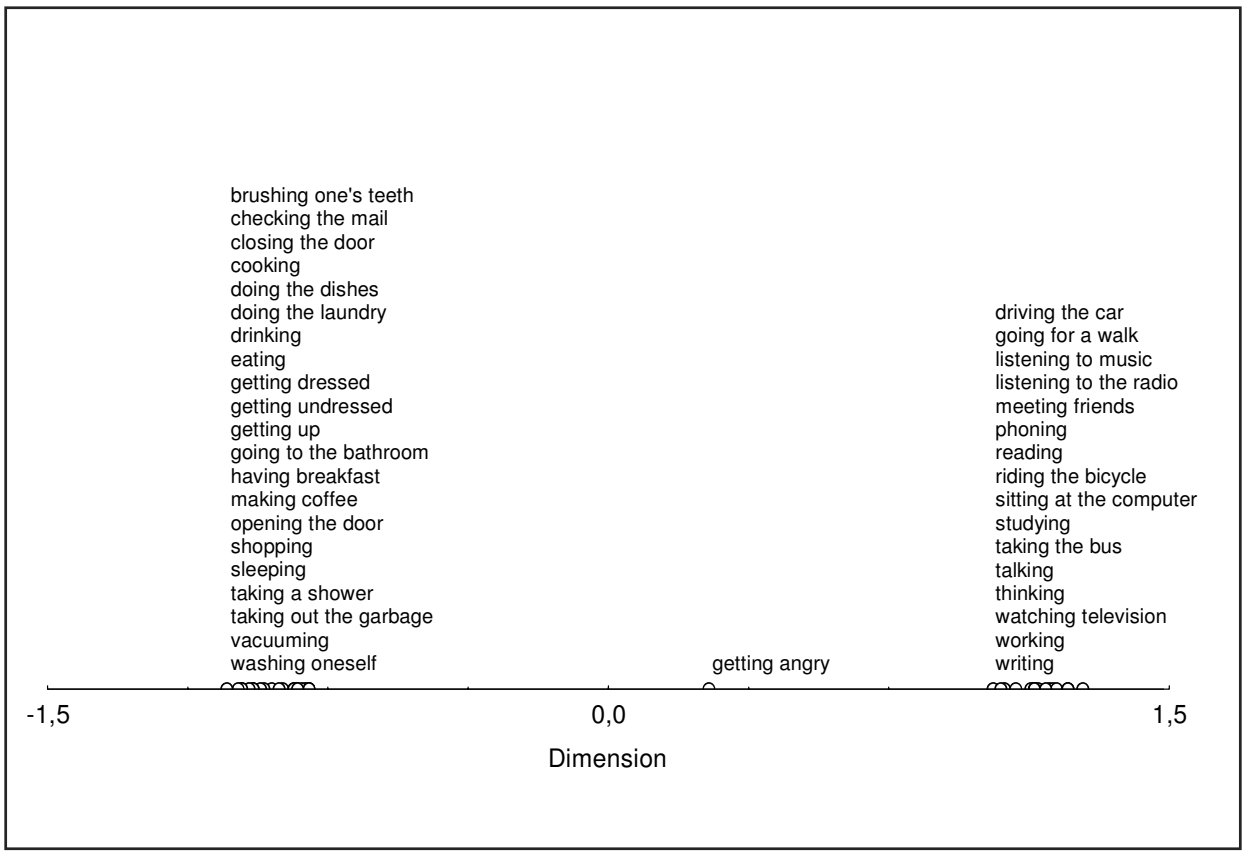

Figure 3. A one-dimensional scaling of the shared event taxonomy.

levels and three subclass groups, and constrained to semantic relations as most participants' taxonomies (for similar examples, compare Figures 1 and 2). This suggests that the shared taxonomy is a fair depiction of the cultural consensus that the participants are instantiating in their taxonomies.

A multidimensional scaling was performed on the averaged distance matrices to derive the dimensions underlying the shared event taxonomy. Results show that a single dimension solution accounted for 94% of the variance. Figure 3 depicts this one-dimensional scaling of the shared event taxonomy. It shows that events are lined along a location dimension, with home and nonhome events at each end, and emotion events in the middle. These findings suggest that the place where an event happens determines its overall position in the shared event taxonomy. By including some additional emotion events (e.g., "being glad"), however, a second orthogonal dimension may emerge (i.e., a pleasure dimension, with pleasant versus unpleasant events at each end).

Conclusions

The combined findings of this experiment show a shared cognitive representation of events in the minds of individuals. This representation amounts to a taxonomy of limited scope and constrained membership in which events are clustered by semantic relations in particular, and alligned on a location dimension in general. Thus, like natural kinds, common events also support the theoretical perspective of cognitive universals in the representation of the world.

The shared event representation shows that people have event taxonomies not restricted to the subordinate, basic, and superordinate levels. For example, the superordinate levels for "doing the dishes" include clean-up events, household events, home events, and common daily-life events. Depending on the context, an event can be represented at any of those levels of abstraction. However, these levels are also limited in number which suggests some pragmatic constrains on abstracting events.

The shared event representation also shows that people have event taxonomies based on semantic relations. For example, "driving the car," "taking the bus" and "riding the bicycle" are clustered together for being transport events. Depending on a specific cognitive task, however, an event could be linked to other events based on different relations. For example, "left the office," "drove the car," and "got home" could be linked chronologically in a memory task. This suggests that the taxonomic representation of events may be a conceptual source from which events could be sampled for further cognitive processes that would relate them in non-taxonomic ways.

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Appendix

Common Daily-Life Events

English Expression	German Expression
brushing one's teeth	Zähne putzen
checking the mail	Post holen
closing the door	Tür schließen
cooking	kochen
doing the dishes	abwaschen
doing the laundry	Wäsche waschen
drinking	trinken
driving the car	Auto fahren
eating	essen
getting angry	sich ärgern
getting dressed	anziehen
getting undressed	ausziehen
getting up	aufstehen
going for a walk	spazierengehen
going to the bathroom	auf Toilette gehen
having breakfast	frühstücken
listening to music	Musik hören
listening to the radio	Radio hören
making coffee	Kaffee kochen
meeting friends	Freunde treffen
opening the door	Tür öffnen
phoning	telefonieren
reading	lesen
riding the bicycle	Fahrrad fahren
shopping	einkaufen
sitting at the computer	am Computer sitzen
sleeping	schlafen
studying	lernen
taking a shower	duschen
taking out the garbage	Müll wegbringen
taking the bus	Bus fahren
talking	reden
thinking	denken
vacuuming	staubsaugen
washing oneself	sich waschen
watching television	fernsehen
working	arbeiten
writing	schreiben