

Why Do We Do What We Do?

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Abstract

We examined the reasons people give for the actions in routine events and classified them as action enablement, main goal satisfaction, or external. We argue that the external reasons indicate that some actions in events are stored at more general levels in memory than the specific event schemas.

There has been a recently re-kindled interest in the relationships between the goals of common activities and the structure of our knowledge of these. A number of researchers (Schank & Abelson 1977, Wilensky 1978, Graesser 1978, Lichtenstein & Brewer 1980) have argued that the goals of familiar events may have stereotypic plan paths associated with them. In this paper we examine the goals and plans for a large number of common activities in the hope of isolating some of the parameters which effect their knowledge representation.

We chose thirty common events for analysis. These included events such as the familiar GOING TO RESTAURANTS activity, as well as SHOPPING FOR GROCERIES, GOING TO MOVIES, CHANGING A FLAT TIRE, BREWING SOME TEA, WASHING CLOTHES, WRITING A LETTER, etc. For each event we picked twelve component actions which described the event from beginning to end. We chose them with the constraint that they not overlap temporally in the performance of the event and that they be at about the same level of description. For example, some of the component actions for the grocery shopping event were

MAKE A LIST, GET A CART, LOAD THE CART, GO TO CHECKOUT, etc. This level of description was felt to be neither too molar (containing a number of discernable actions) nor too molecular (specifying fine-grained motor movements).

These same stimulus materials have been used in a number of other experiments investigating the structure of memory for events. In the course of those studies, a number of norms were collected including the importance or centrality of the component actions for the event, the frequency of performing the action when doing the event, the sequential order of the actions and finally the frequency of being in the event when performing the action. This last measure I have called the distinctiveness of the action to the event. For example the component action EAT THE MEAL is not very distinctive to the restaurant event since the action of eating is done in many other situations. In this example the distinctiveness of the action and its importance to the event are orthogonal in that eating is highly important to the event but not highly distinctive. In contrast the action SEE HEAD WAITER is highly distinctive to the restaurant event because it is done almost exclusively in that situation. Distinctiveness of an action can be seen as a measure of the extent to which that action has an independent existence outside the context of the event. This factor will figure in our discussion of the results.

The present study involved presenting subjects with event-action pairs and asking them to write down their reasons for performing the action in the context of the event. The original intent was to use the results to develop superordination and subordination relations among the actions as has been done in studies by Graesser and Lichtenstein & Brewer. There are a number of methodological differences between this study and the others. Perhaps the most salient of these is the absence of a particular instantiation of the events and their components via the presentation of a videotape or story depicting the event. Our subjects were asked to rely on their

knowledge of the events to help them provide their reasons for the actions. When subjects are presented with an instance of an event, they understand it by interfacing their general knowledge of that type of event with the explicit details provided by the story. The results of testing memory performance for that story must be interpreted as some function which includes contributions from both the specific details and the pre-existing knowledge base. A further source of potential variance arises from reconstructive strategies which occur at the time of testing. Most research in this area has attempted to minimize the effect of the specific detail in the story by devising stimulus materials which are as dull and boring as possible. This is cited as a methodological virtue because dullness is thought to indicate that the story matches the most typical or least deviant plan path through the actions in the event. While this general technique had yielded a great deal of insight into comprehension and memory for text, it is important to note that the knowledge base for an event prior to instantiation may differ significantly from the representation that results from its application to the task of understanding a particular instance.

Specifically, our underlying knowledge of common events is flexible enough to permit a wide variety of different realizations of those events. For instance, while the restaurant event may often occur in contexts where the primary goal is to satisfy hunger, it also occurs in the service of other overriding goals such as to celebrate some notable happening, or to conduct some business, or to fulfill a desire for an evening's entertainment. Performance of the event under these differing circumstances may alter the salience of certain actions in the event by changing the internal goal structure and consequently the plan paths connecting the component actions.

By analyzing the reasons that subjects give for the actions it is possible to outline the range of flexibility in the representation of events as goal directed. The type of reason

given for an action can be an index for the sort of goal that governs its presence in the event. Furthermore when subjects give more than one type of reason or do not agree highly as to the best reason then it is often possible to glimpse some of the parallel goals underlying the event.

A first step in this analysis is the categorization of the reasons into general types. Clearly this analysis has a number of methodological difficulties. This free generation paradigm tends to lead to idiosyncrasies in the responses obtained. However in an exploratory experiment such as this such lack of constraint can be considered a virtue. It is often the response which is the outlier in a frequency distribution which can provide an important insight. With this in mind we attempted to organize the reasons into three types. The first we call the action enablement type. It is this type of reason that Graesser and Lichtenstein & Brewer examine and is the most common type. This type of reason mentions immediately subsequent actions in the event. For instance in the CHANGING A FLAT event the most common reason for the action of GETTING THE JACK mentions the subsequent actions of POSITIONING THE JACK and RAISING THE CAR. There are different types of enablement which when used to construct internal goal hierarchies result in different kinds of structures. Some of these enablement relations reflect or perhaps underly a fairly strict temporal sequence of actions. Discontinuities between the action sequences and the enablement structures often reflect segmentations that can be considered as the scenes of the event (Schank & Abelson, 1977).

The second type of reason we will consider is often given for the actions that immediately precede these points of discontinuity. Our second type of reason we call main goal satisfaction. A reason of this type involves mentioning the main goal of the event. This is often accomplished by merely restating the name of the event. For instance, in the WASHING CLOTHES event the segment which includes the loading of the washer and putting in the soap

appears to conclude with the action TURN ON WASHER. The reasons given for this action are "to wash the clothes" or "to get clothes clean". There is little mention of reason concerned with the enablement of the subsequent actions involved in drying the clothes. While this result is useful in specifying the relations of lower level event goals to the main goal of the event it also poses a problem for those who attempt to account for the serial order of the action on the basis of goal structure. The problem is that there are rather glaring gaps in the representation which must be bridged by some means other than internal plan paths. It is however outside the scope of this paper to consider possible ways to close these gaps. There are many instances of reasons of this second type which are given for actions that are not at scene boundaries. The presence of these further argue for a flexibility in the event representation whereby actions may or may not be dominated by internal goals depending on the particular instantiations of the event.

The final member of our typology of reasons is called the external variety. External reasons are those which mention very high level goals such as preservation of health, cleanliness, avoidance of danger or legal and social punishment, and maximization of pleasure or enjoyment. Some of these reasons are related to goals for which the event itself functions as fulfillment. Others are general modes of operation such as to preserve money. For example, in the GROCERY SHOOPING event the reasons for the action CHECK THE PRICE were "to save money for other things", or "to avoid being cheated." External reasons often tended to be the outliers we spoke of earlier. It is these actions which were often more general in the sense that they could occur in other events. Furthermore since the external reasons provided points of connection with more general goals they often offered a delimitation of the set of occasions for the performance of the event. By a more detailed examination of the interaction of the kinds of high level goals which could govern the entry into the event with the internal goal structure it may

be possible to specify a range of acceptable variation in the types of stories which count as instances of the event. This in turn may provide a way to constrain the representation of events so as to attain the desired flexibility without losing the important aspect of stereotypy which binds different instances of the same event.

Schank (1980) proposed a theory which satisfies these two criteria. One of the important points in this model is the restriction of the role of the script representation. These structures have been stripped of any information which can be generalized out of the script and stored at higher levels in memory. In our terms this would mean that the event level of representation would contain only those actions and goal relations which were incapable of directly fulfilling higher level goals or those which never occur except in the context of a particular event. Although it remains to be worked out in detail there is important support for this view which arises from the results of our analysis of reasons into the three types. It appears that those actions which received reasons of the external type are just those which are susceptible of generalization. Further support for this claim comes from looking at the relation of the distinctiveness rating of an action with the type of reason given for it. It turns out that highly distinctive actions are those which receive exclusively internal reasons and the less distinctive actions are those which have reasons which refer to higher level goals. Recall that the distinctiveness factor indicates the extent to which an action exists outside of a particular event. Thus the correlation of distinctiveness and type of reason provides evidence for the concept of generalizing information out of the script representation. Furthermore a careful analysis of the types of reasons given for actions may lead to a principled way to carry out this project.

In this paper we have attempted to argue for the importance of recognizing that the representation of common events must provide for a wide range of

variability. Indications of this range can be obtained by examining the various purposes for the component actions. Our rough taxonomy of reasons has yielded some evidence in support of a model of memory representation which permits such variability. While there are still a number of important issues which must be addressed, it appears that there are a number of theoretical benefits for considering why we do what we do.

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