Activity States Framework as an Experimental Approach to Studying and Modeling Context in Web-Mediated Collaborative Dialogs

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Abstract

We have experimented with the notion of — *conceptualization, and contextualization* from situated cognition and *psychic reflection* from activity theory for studying, and modeling context into a method called the *activity states framework* (ASF). The purpose of the ASF is to provide a method of analysis for identifying collaborators activity during situated context − specific to Web-mediated collaborative dialogs. This paper introduces the ASF.

Introduction

We have experimented with three notions: *conceptualization, and contextualization* from situated cognition (Clancey, 1997), and *psychic reflection* from activity theory (Leont'ev, 1978) for studying, and modeling context into a method called the *activity states framework* (ASF) (Binti Abdullah, 2006). The purpose of the ASF is to provide a method of analysis for identifying collaborators activity during situated context. We foresee that the results of the work can be used to guide human-computer interaction design for Web-mediated collaborative dialogs. In this paper we introduce the ASF.

Theoretical foundation

In Clancey (1997), the author views context as a mental construction for a person at two levels. The first level looks into the abstraction of how people are acting in a setting - explained by the term *conceptualization.* The second level looks into the memory-perception process itself, captured by the notion on *contextualization.* Conceptualization is a higher level of the notion context 'What I am Doing Now'. Contextualization is a notion used to describe how contexts are conceived at the conceptual-memory level. Activity theory proposes a very specific notion of context: the *activity itself is the context.* The notion of 'psychic reflection' is

used for studying human activities - studied by the object, and subject transformation. An object is defined in the sense as being 'objective'. A subject is defined a person or a group engaged in an activity. The object is held by the subject and motivates it, and in the course of the subject's engagement of the activity, the object is transformed**.**

Activity states framework (ASF)

The term 'activity states' is based on situated cognition (Clancey, 1997) and activity theory (Leont'ev, 1978). It is defined as the level of attention that a speaker is engaged in during his construction of his situated activity, as illustrated in Figure 1 below.
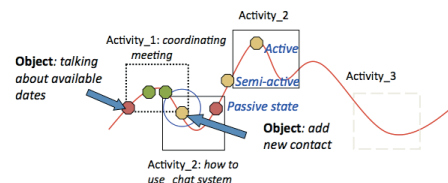

Figure 1. Collaborator's level of attention.

Refer to Figure 1. The red line represents the level of attention of a collaborator – that is categorized from passive, semi-active, to active (see the text in blue). *Passive* signifies that a collaborator is just about to begin a new activity. *Semi-active* signifies that a collaborator is pursuing the activity. While *active* signifies that the collaborator is about to reach the object of the activity. The squares represent the type of activities that collaborators are engaged in. Overlapping squares represent that the collaborators are multi-tasking their activities during the collaboration. In order to project the analysis as shown in Figure 1, we use the notion of object, and subject from activity theory (Leont'ev, 1978) to infer the activity states, and to give a label to the activity. In ASF, an object is also defined as a conception. Subject in ASF is defined as the reference to the conception. In the next section, we introduce the ASF workflow.

The ASF workflow

The ASF workflow provides steps on how to analyze the dialogs for identifying collaborators situated activities based on the basis idea of ASF. We show the workflow in Figure 2 below.
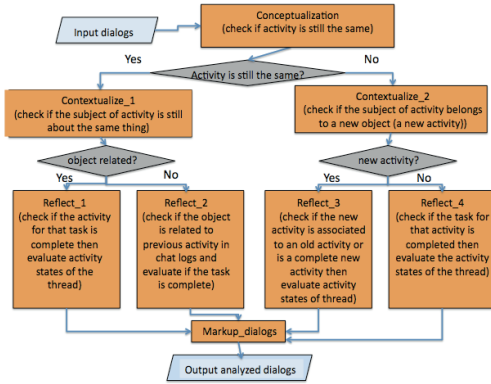

Figure 2. ASF workflow.

The workflow applies the three notions: conceptualization, contextualization from situated cognition (Clancey, 1997) and psychic reflection from activity theory (Leont'ev, 1978) as processes. The input to the workflow is utterances. Each utterance(s), for example 'just need 5 minutes' is referred to as 'activity'. The workflow starts with the process *Conceptualize.* At this process, the process compares the present and previous utterance to 'get information' whether the activity is still similar. As an example, the currently analyzed utterance is 'just need 5 minutes', and the previous utterance is 'hang on, I should be able to push this' by the same speaker. The speaker was previously engaged in the activity of writing an article together with the other collaborator. Since the two utterances are still about writing an article together, the next process is called, Contextualize_1. At *Contextualize_1* the process checks whether the subject of the activity is still about the same thing (e.g., the object is to write a paper together, and the subject is still about sending a file). At this step the object and subject of the utterance is identified. *'just need'* is segmented as an object since it indicates that the speaker's purpose is informing a particular action to the listener. *'5 minutes',* is segmented as the subject since it indicates that the particular action is for the listener to give the speaker 5 minutes.

At *Reflect_1*, the process checks if the object of the activity is completed and then it evaluates the 'activity states' of the utterance. In our example, 'just need 5 minutes' indicate that the object of the activity - to send the file has not yet been completed. Since the subject has been introduced (i.e., a word file) in the previous utterance, the value of the activity states of the utterance is increased from a passive to a semi-active state. At *Markup_Acl,* the appropriate communicative acts (i.e., CA) is selected to represent collaborator's activity based on the activity states

evaluation. This is done in the following. Fipa-Acl CA (Fipa-Acl, 2000) (see Appendix A) is specified with a message content and description. The communicative acts that can best represent the activity states are grouped together. As an example, 'inform', and 'query-ref' (i.e., asking how a person are) are grouped together to belong to the *passive state* (see Appendix B). In our example, the activity states of the analyzed utterance 'just need 5 minutes' is semi-active, thus the process looks directly into the semi-active category. It compares the meaning of the object, and subject of the analyzed dialog to the CA grouped under this category. In our example, we have the object 'just need' that represents an action, and the subject '5 minutes' that represents the information of the action. Hence the utterance 'just need 5 minutes' is labeled with 'request when' since the object and subject of 'just need 5 minutes' corresponds to the 'request when' CA specification. We use this format for representing the analyzed utterance(s): speaker A listener B communicative act X:content (object (subject)). Thus we have the analyzed utterance represented as: *speaker A listener B request when: content: (just need (5 minutes)),* and label the context as 'activity sending file'.

Conclusion and future work

In this paper we have introduced the ASF, a method of analysis for identifying collaborators activity during situated context. The ASF provides a workflow that applies these notions: conceptualization, contextualization from situated cognition (Clancey, 1997) and psychic reflection from activity theory (Leont'ev, 1978) to guide the design of the workflow. Our future work will implement the workflow into a system.

Appendix A

Fipa-Acl communicative act	Message content and description
Request-when	Message content: A tuple of an action description and a proposition. Description: *Request-when* allows an agent to inform another agent that a certain action should be performed as soon as a given precondition, expressed as a proposition, becomes true.

Appendix B

Activity states categories	Communicative acts
Passive	Greet, express, inform, query-ref..
Semi-active	Query-if, request when, inform-ref…
Active	Agree, inform-if, inform-ref..

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