

Use of GPS to Automatically Track Activity Rescheduling Decisions

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1. Introduction

This paper/poster describes and assesses a multi-stage data collection methodology for exploring the activity (re)scheduling decision process as it occurs in reality. A unique combination of manual, open-ended, computerized, and passive tracking survey technologies were utilized. Each of the six stages of data collection are described in detail below. This approach was intended to reduce respondent burden, increase capture of rescheduling decisions, and provide a forum for in-depth probing of decision scenario.

2. Methodology and Analysis

Stage 1: Preplan Schedule

An open-ended method was used to capture preplanned schedules. Subjects were given a blank piece of paper and asked to: *“Write down your schedule for the next two days in as much or little detail as known and verbalize what you write”.* They were encouraged to discuss all activity attributes (i.e. times, locations, involved persons), and the extent of planning.

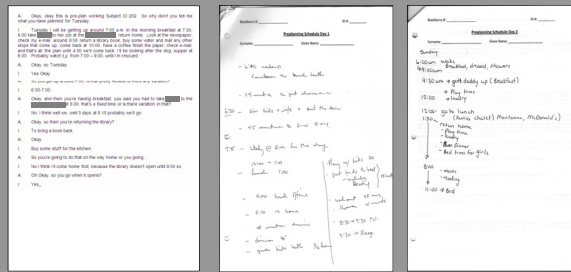
The degree of attribute preplanning varied significantly

	Start Time	End Time	Activity/Mode Type	Location	Involved Persons
Fully Planned	63%	56%	80%	88%	33%
Partially Planned	30%	13%	18%	9%	21%
Unplanned	7%	32%	2%	3%	46%

The way people expressed partially elaborated attributes also varied

Partially Elaborated Methods	Start time	End Time	Activity/Mode Choice	Location
i. Interval	34%	48%	0%	0%
ii. Verbal	66%	47%	0%	0%
iii. Symbols	0%	4%	0%	0%
iv. General Statement	0%	0%	86%	47%
v. List of Choices	0%	0%	14%	53%

Three distinct preplan reporting styles emerged



a) Verbal Preplanned Schedule (15%)
 b) Point Form Format Schedule (39%)
 c) Calendar Format Schedule (46%)

Stage 2: Coding Preplanned Schedule

Preplanned schedules were coded into a table for analysis in Stage 5. Coding was complicated by the varied nature in which attributes and their degree of planning were voiced, requiring multiple field types.

Stage 3: GPS Passive Tracking

Subjects wore a GPS-enabled Blackberry for a two day period. Logged data was transmitted wirelessly to a central server.



Stage 4: Internet-Based Prompted Recall Diary (IBPRD)

At regular periods during the day, an algorithm on the central server processed the GPS data and outputted a sequence of predicted trips and activities. These were displayed to subjects via an internet based diary. Subjects interacted with the diary in order to confirm, update, and add attributes.

Example Initial Diary

After manual updating

Note: Data has been modified to protect subject identity

Stage 5: Comparison of Preplanned to Executed Schedules

Comparison of the preplanned (stage 1) and the executed schedules (stage 4) allowed an automated means to identify attributes of preplanned activities that were modified, and added/deleted activities. These scheduling changes were colour coded on the IBPRD exported file as seen below. Red indicates deletions of activities, green indicates additions, and blue indicates modifications.

Start Time	Start Date	End Time	End Date	Main Event	Sub Event	Location	Person1	Relationship1	Person2	Relationship2
9:45 AM	07/07/2007	10:45 AM	07/07/2007	Activity	Recreation->Surfing Trip	Home				
10:45 AM	07/07/2007	12:30 PM	07/07/2007	Activity	Entertainment->TV Programs	Home				
12:30 PM	07/07/2007	1:30 PM	07/07/2007	Activity	Basic Needs->Wash/Dresspack	Home				
1:30 PM	07/07/2007	3:30 PM	07/07/2007	Activity	Household->Household->Cleaning/maintenance	Home				
3:30 PM	07/07/2007	4:45 PM	07/07/2007	Activity	Social->Hitting visitors	Home				
4:45 PM	07/07/2007	4:50 PM	07/07/2007	Trip	Automobile					
4:50 PM	07/07/2007	5:27 PM	07/07/2007	Activity	Normal Shopping->Major Groceries (150 Items)	Great Canadian Superstore				
5:27 PM	07/07/2007	5:30 PM	07/07/2007	Trip	Automobile					
5:30 PM	07/07/2007	6:40 PM	07/07/2007	Activity	Normal Shopping->Major Groceries (150 Items)	Price Chopper				
6:40 PM	07/07/2007	6:45 PM	07/07/2007	Activity	Social->Hitting visitors	Home				
6:45 PM	07/07/2007	7:00 PM	07/07/2007	Activity	Basic Needs->Home prepared meals	Home				
7:00 PM	07/07/2007	7:30 PM	07/07/2007	Activity	Basic Needs->Home prepared meals	Home				
7:30 PM	07/07/2007	9:30 PM	07/07/2007	Activity	Entertainment->TV Programs	Home				
9:30 PM	07/07/2007	9:30 PM	07/07/2007	Activity	Recreation->Surfing Trip	Home				
9:30 PM	07/07/2007	11:00 PM	07/07/2007	Activity	Basic Needs->Wash/Dresspack	Home				
11:00 PM	07/07/2007	11:30 AM	08/07/2007	Activity	Basic Needs->Wash/Dresspack	Home				
11:30 AM	08/07/2007	9:30 AM	08/07/2007	Activity	Basic Needs->Wash/Dresspack	Home				
9:30 AM	08/07/2007	10:30 AM	08/07/2007	Activity	Recreation->Surfing Trip	Home				
10:30 AM	08/07/2007	10:45 AM	08/07/2007	Activity	Basic Needs->Wash/Dresspack	Home				
10:45 AM	08/07/2007	11:00 AM	08/07/2007	Activity	Recreation->Surfing Trip	Home				
11:00 AM	08/07/2007	11:50 AM	08/07/2007	Trip	Automobile					
11:50 AM	08/07/2007	11:50 AM	08/07/2007	Activity	Social->Religious events	Home				
11:50 AM	08/07/2007	11:50 AM	08/07/2007	Activity	Social->Religious events	Home				
11:50 AM	08/07/2007	11:50 AM	08/07/2007	Activity	Social->Religious events	Home				
11:50 AM	08/07/2007	11:50 AM	08/07/2007	Trip	Automobile					

Stage 6: In-depth Rescheduling Interview

This interview focussed on eliciting more in-depth information on *when, how and why* the various rescheduling decisions identified in Stage 5 were made. The questions asked and example responses are given below.

When did you decide to add/delete/modify the activity?	What caused you to add/delete/modify the activity?	What process did you go through to add/delete/modify the activity?	Did the addition/deletion/modification change the remainder of the two days?
<p>Question: You originally planned on getting a ride with a friend but you never did. When did you decide to drive yourself?</p> <p>Answer: I phoned her to see if I could get a ride with her and she said she had a 7AM shift, which is an hour earlier start than me. So I just decided to take my car.</p>	<p>Question: What caused you to come back to work at 11:53?</p> <p>Answer: In the morning when we were about to head out Scott realized that we had a tax meeting which starts at 12:00 and runs until 1:00 and we signed up. RM isn't too far away so we came back.</p>	<p>Question: How did you go about making a decision with him to meet there?</p> <p>Answer: I called him the morning of.</p> <p>Question: Can you explain the process you went through when you realized you wouldn't be going to get the car fixed?</p> <p>Answer: We weren't going to get the car repaired after I phoned the dealership. The tire can only be found in Saskatoon. I decided to order this other tire and I will be going tomorrow when I get the oil changed and car washed.</p>	<p>Question: Did that change the rest of your day at all?</p> <p>Answer: Not the rest of my day. I was more worried about getting to work on time, but I made it on time, so then everything was okay.</p> <p>Question: Did that change what you were planning the rest of your day at all?</p> <p>Answer: Just that I had to work longer, I might have covered that fifteen minutes or so I had to squeeze in. It really didn't change it significantly.</p>
<p>Question: When did you make this decision to go to Williams?</p> <p>Answer: Around 4:15 my friends told me they were going out, so they invited me along.</p>	<p>Question: You were a little late getting to work. You said you started at 1:00. Any reason for this?</p> <p>Answer: Yes, I decided to get a ride with my mom. So we had to go by her time table.</p>		

3. Summary & Conclusions

Key insights into the scheduling process that were revealed include:

- Activity attributes are planned on varying time horizons
- Partially elaborated attributes are described in varied ways
- Rescheduled often has elaborate reasoning and impacts

Key methodological findings/issues include:

- Preplanned activity scheduling surveys should pay careful attention to the interface/report-format
- Asking the question *“When was this activity planned”* will be complicated by partially elaborated attributes
- Attribute planning questions should allow for multiple types of responses
- Comparison of preplanned to GPS-tracked activities represents an automated means to detect rescheduling decisions (start/end time, locations changes, and more impulsive additions)
- Results suggest that this method elicits at least twice as many modifications as from previous self-reporting methods