

Episode-based implementation in m-Path

Jordan Revol, Sigert Ariens, Ginette Lafit, Janne Adolf, and Eva Ceulemans

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Introduction

This document is a tutorial to implement an episode-based design in m-Path (Mestdagh et al., 2022). The core concept involves triggering follow-up questionnaires whenever the outset of an episode is detected based on chosen quantiles (e.g., 15th and 85th quantiles). These quantiles are estimated over a designated baseline period, such as one week, in which only regular beeps are sent to a participant. During the subsequent period (e.g., two weeks), should the variable's value rise above or fall below the chosen quantile values, a series of follow-up questionnaires will be initiated at predetermined intervals (e.g., every 10 minutes) after a regular beep.

In the tutorial, we will consider the variable “bipolar” as the variable of interest. Therefore, during one week (the baseline period), the variable's value will be collected across regular beeps. During the remaining weeks, follow-up questionnaires will be triggered after a regular beep when this variable's value is below the 15th or higher than the 85th quantiles.

Implementation steps

1. **Create the item that will trigger the follow-up.** In our example, we want to measure the ‘bipolar’ variable. In the main questionnaire (see m-path tutorial to create one), we create a slider item with the following specifications:
 - Type: Slider negative to positive
 - Question or statement: How do you feel right now?
 - Label: bipolar
 - Min: 0
 - Max: 100
 - Slider start value: 50
 - Required: Yes
 - Custom anchors: Yes
 - Left anchor: Very negative
 - Middle anchor: Neutral
 - Right anchor: Very positive
2. **Create a computation item that will trigger the follow-up questionnaires.** This item will be used to estimate the quantiles, and, later, trigger the follow-up questionnaires. Importantly, you have to label the computation item and use this label for a variable in the pseudo R code. In the pseudo R code, either it is assigned 1 (i.e., trigger follow-ups) or 0 (i.e., do not trigger follow-ups) to this variable. In our example, the label of the computation item is “trigger_followup”. In the code, the ‘baseline_period’ variable is the number of days of the baseline period (7 days in our example). Note that:

- the value of the variable created in step 1 (in our example “bipolar”) will be accessible in the pseudo R code allowing to decide to trigger (or not) follow-ups.
- the pseudo R code is not R but a simplified version of it. For further details see: <https://m-path.io/manual/knowledge-base/computation-item-r/>.

The pseudo-R code for our implementation is the following:

```
# load all previous scores (if any)
load("l_bipolar")
# Create the list if it does not exist yet
# i.e., at the first time the participant answers the item
if(mean(is.na(l_bipolar))){
  l_bipolar=c()
}

# load all previous dates (if any)
load("datelist")
# Create the list if it does not exist yet
# i.e., at the first time the participant answers
if(mean(is.na(datelist))){
  datelist=c()
}

# Define the baseline period in days
baseline_period = 7

# Store the date of the first answer
if (is.empty(datelist)) {
  datelist = as.Date(time) # Save the date of the first answer
  save("datelist") # Save the vector again

  # Do not trigger follow-ups during the baseline periods
  trigger_followup = 0

  # Store the date of each new day in the baseline period
} else if (length(datelist) <= baseline_period){
  # Get date
  date = as.Date(time)

  # Save dates
  if (datelist[length(datelist)] != date){
    datelist = c(datelist, date)
  }
  save("datelist") # Save the vector again

  # Gather bipolar_baseline in the list
  l_bipolar = c(l_bipolar, bipolar)
  save("l_bipolar") # save vector again

  # Do not trigger follow-ups during the baseline period
  trigger_followup = 0

# Trigger follow-up after the baseline period
} else {
```

```

# Compute q values
q_value = .15
q1 = quantile(l_bipolar, q_value)
q2 = quantile(l_bipolar, 1 - q_value)

# Trigger based on quantile
if (q1 > bipolar | q2 < bipolar){
  trigger_followup = 1
} else {
  trigger_followup = 0
}

# Save threshold decision values
save("q1")
save("q2")
}

```

3. **Add follow-up items within the computation item.** You must add as many follow-up items as you need follow-ups to be triggered when the onset of an episode is detected based on the quantile. Importantly, you must specify the delay in minutes for each follow-up measurement, accounting for the fact that the delay is from the computation item. For instance, if you want 10 minutes between each follow-up, you must mention 10 in the first, 20 in the second, etc.. You must also specify the “expires after” element (in minutes) for each follow-up item, otherwise all the follow-up questionnaires will remain available to the participant until they are answered, even after the next follow-up questionnaire has been triggered. Here are the specifications for each item:

- Type: Follow-up
- Conditional: Yes
- Labels: followup1; followup2; etc.
- Delay (in minutes): 10; 20; etc.
- Follow-up interaction: followup questionnaire
- Expires after (in minutes): 8

4. **Create the follow-up questionnaire called ‘followup questionnaire’.** You must create the follow-up questionnaires that will be triggered in the function of the value of the variable. In step 3, we have specified the follow-up interaction as being named “followup questionnaire”. Therefore, you must create a questionnaire with this same label. First, click on the “+” sign at the top and select “start from scratch”. Then, click on the logo to “Edit properties” and rename the questionnaire to “followup questionnaire”. Secondly, create a question item, in our example, it is a slider item. The specification of this slider item is similar to the item that triggers the follow-up (see step 1).

Importantly, **take the time to test your implementation** to ensure that the follow-up questionnaires are triggered as expected.

Further functionalities

The pseudo R code can be adapted to implement further functionalities such as:

- Not triggering follow-ups before/after a specific time in the day (e.g., note after 23 pm).
- Allowing follow-ups to be randomly triggered, and not only based on quantiles.
- Not triggering follow-ups more than 3 or 4 times in a row.

References

Mestdagh, M., Verdonck, S., Piot, M., Niemeijer, K., Kuppens, P., Dejonckheere, E., et al. (2022). M-path: An easy-to-use and flexible platform for ecological momentary assessment and intervention in behavioral research and clinical practice.