Research IT innovation fund 2019: *Adapting Qualtrics for peer report questionnaires*

Functional specifications

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Summary grant proposal

Description of IT innovation. Researchers who study social groups often apply peer reports. Peer reports use members of a group as a source of information to measure social behavior of individual members (e.g., "Who helps others?"; Who bullies others?") or the relations between them (e.g., "Who do you like the most"?). Examples of groups include the work place, old people's homes, prisons, sports teams, and school classes. Compared with questionnaires that rely on other sources of information (e.g., boss, team leader, teacher, parent, self) peer reports have several advantages. An important advantage is that peers are well-informed and provide direct insider information of group behavior and relations. Another advantage is that peer reports are derived from multiple assessors, which increases reliability. Peer reports are usually gathered using paper-and-pen procedures. Online questionnaires provide savings regarding time, effort and money. However, both FSWSurvey and Qualtrics -- the online questionnaire software packages provided by the UU-- are not suitable for peer reports. According to the H&S App-team, Qualtrics allows for custom programming which enables us to adapt Qualtrics to support peer reports. We plan to develop such adaptations so that Qualtrics can handle peer reports *and* export peer report data effectively. More specific, the adaptations

1) cover both peer *nominations* and peer *ratings*;

2) present the individual with a list of peers (group members) without the individual him/herself;[3]

3) compute the number of times an individual is nominated by his/her peers (indegree) or the mean rating received;

4) provide data that can be used for social network analysis (e.g., Excel sheets with information about voters and nominees; adjacency matrix).

Specification of end product. We will develop an extension to the standard Qualtrics package that supports importing groups of participants to automatically create peer report questionnaires for each individual group member. For each participant, their peers will be automatically imported as response options on a range of different questions. Secondly, we will develop an application to support effective data recoding from Qualtrics into data formats that can easily be imported and analyzed. This format will be applicable to both standard statistical analysis (for packages such as SPSS) and for social network analysis.

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[3] Randomization of the order in which the group members are presented is easy to accomplish in Qualtrics.

Introduction

Rating scales are widely used in survey research. A rating scale is a method that requires the rater to assign a value to the rated object. The following examples are from a teacher questionnaire and a self-report, respectively.

This child usually gets the best roles in class activities.

| ☐ (almost) never | ☐ rarely | ☐ sometimes | ☐ often | ☐ very often |

I am a great example for other kids to follow.

| ☐ not at all true | ☐ slightly true | ☐ mostly true | ☐ completely true |

Peer reports

In contrast to rating scales as the ones above, researchers who study social groups often apply peer reports. Peer reports use members of a group as a source of information to measure social behavior of individual members. For example, a child's behavior is evaluated by the peers in his or her classroom (e.g., $N = 25$) or his/her grade (e.g., $N = 225$). Compared with questionnaires that rely on other sources of information (e.g., teacher, self, parent, boss, team leader) peer reports have several advantages. An important advantage is that peers are well-informed and provide direct insider information of group behavior and relations. Another advantage is that peer reports are derived from multiple assessors, which increases reliability. Using peer reports requires adaptation of online questionnaires such as Qualtrics, however, both with respect to designing peer reports and to exporting peer report data.

1. Designing peer report questionnaires

There are several forms of peer reports: peer nominations, peer ratings, and paired comparisons.[4] A key component of these peer reports is that other members of the same group are used as response options within the questionnaire. As such, peer reports require a method to import the names and possibly other information (e.g., sex) about all group members and to use this data to create response options. If a group consists of five members (A, B, C, D, E) then data for all these five participants needs to be imported into Qualtrics. Appendix 1 can be used as a list to import names (school class).

The specific applications of the imported group member data for peer nominations, peer ratings and paired comparisons are described below.

1.1 Peer nominations

Each respondent is asked to nominate group members as an answer to a question, for example: "Who helps others?". This could be done, for instance, by clicking on the names of the group members in a drop down list or putting a mark (e.g., bullet; see example below).

WHICH CHILDREN IN YOUR CLASS …		
…try to get what they want by forcing others?		
	Not applicable	Usually applicable
Gerlinde Boekhold	○	○
Tony Voskuil	○	○
Tinka den Oudsten	○	○
Lisa Kuipers	○	○

The way of nominating should be easy for respondents.

There are several options used in scientific practice that we would like to implement. **The ones in bold indicate my (Marjolijn's) preferred options.**[5]

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[4] Bukowski et al. (2012)
[5] Thanks to dr. Zeena Harakeh who checked my 'wish list'.

1) **The name of the child is <u>not</u> part of the list**

Examples for a group of 5 persons:

Who helps others? (filled in by person A)

    Person B

    Person C

    Person D

    Person E

Who helps others? (filled in by person E)

    Person A

    Person B

    Person C

    Person D

2) **The respondent can choose from:**
   - **a list of <u>all remaining</u> group members** (e.g., all classmates)
   - a subset of randomly selected group members (e.g., 25 grade mates)
   - a specific subset of group members, based on other data on group members (e.g., a list of only female classmates if the respondent is female)[6]
   - a subset of randomly selected names from a specific subset of group members (e.g., 25 randomly generated names of same-sex grade mates)

3) **For each question the group members are arranged in:**
   - **a random order** (function already available in Qualtrics)
   - the same order (e.g. alphabetical)

4) **The respondent can nominate:**
   - **as many group members as s/he wants, including none at all (i.e., "nobody")**
   - up to a number of classmates (e.g., three) and fewer if they want
   - a fixed number of classmates (e.g., three)

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[6] E.g., Wentzel & Asher (1995)

1.2 Peer ratings

The respondent rates group members on a rating scale (e.g., on a 7-point scale ranging from very dislikeable (-3) to very likeable (+3).[7] See example below:

How much do you like …							
	Very dislikeable	**Dislikeable**	**Just dislikeable**	**Don't know**	**Just likeable**	**Likeable**	**Very likeable**
Gerlinde Boekhold	O	O	O	O	O	O	O
Tony Voskuil	O	O	O	O	O	O	O
Tinka den Oudsten	O	O	O	O	O	O	O
Lisa Kuipers	O	O	O	O	O	O	O

Marjolijn's preferred options (in bold) are similar to the ones for peer nominations described above:

1) **The name of the child is <u>not</u> part of the response option list**
2) **The respondent has to rate:**
    - o **<u>All remaining</u> group members** (e.g., each classmate)
    - o a random selection of classmates (e.g., five)
    - o a specific subset of group members, based on other data on group members (e.g., a list of only female classmates if the respondent is female).
    - o a subset of randomly selected names from a specific subset of group members (e.g., 25 randomly generated names of same-sex grade mates).
3) **For each question the group members are arranged in:**
    - o **a random order (function already available in Qualtrics)**
    - o the same order (e.g., alphabetical)
4) **Sometimes students are asked to first nominate classmates** (e.g., "Which children in your class try to get what they want by forcing others?") **and then to rate the behavior of the nominated classmates** (e.g., to indicate whether the nominee displays the behavior "sometimes" (scored as 1) or "often" (scored as 2).[8] Basically, this procedure can be shaped as rating classmates (e.g., on a 3-point scale with "never" (0), "sometimes (1) and "often" (2):

WHICH CHILDREN IN YOUR CLASS …

…try to get what they want by forcing others?

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[7] E.g., Reijntjes et al. (2018)
[8] Vermande et al. (2018)

	Never	Sometimes	Often
Gerlinde Boekhold	○	○	○
Tony Voskuil	○	○	○
Tinka den Oudsten	○	○	○
Lisa Kuipers	○	○	○

A two-step procedure, however, may be easier for the respondent to complete. Is this possible?

1.3 Paired comparisons[9]

A third method of data collection are paired comparisons (e.g., "Choose the person you would like to play with the most").[10] Respondents are presented with all possible combinations of pairs of group members. For example:

WHO WOULD YOU PREFER TO PLAY WTH?		
○ Gerlinde Boekhold	or	Tony Voskuil ○
○ Tinka den Oudsten	or	Gerlinde Boekhold ○
○ Tony Voskuil	or	Tinka den Oudsten ○
○ Gerlinde Boekhold	or	Lisa Kuipers ○
○ Tinka den Oudsten	or	Lisa Kuipers ○
○ Lisa Kuipers	or	Tony Voskuil ○

These can be all group members or a subset of group members (e.g., children in the respondent's sex and age group). Marjolijn has no preferred options (although she has used the option children in the respondent's sex and age group in an offline procedure).

The order in which the pairs are presented and the position of each group member's name (e.g., on the left or on the right side) are randomly determined.

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[9] Unfortunately, it has not been possible to implement pairwise comparisons in Qualtrics.

[10] E.g., Birch & Billman (1986)

2. Exporting peer report data

The ready-to-use data have to be applicable to both standard statistical analysis (for packages such as SPSS) and to social network analysis (for packages such as *R*). **Marjolijn is now mainly interested in descriptive statistics**, but others (and possibly Marjolijn in the future) are also interested in social network analysis.

2.1 Peer nominations and descriptive statistics
1) **The number of times a child has been nominated by classmates for each item (i.e., the *indegree*).**
2) **The number of nominators or voters (i.e., classmates who answered the question) for each item.**
3) **The number of group members nominated by the participant (i.e., the *outdegree*).[11] It has to be clear which group members did participate but answered "nobody" and which participants did not participate. If an individual did not participate, the outdegree should be missing or coded (e.g., 99).**

2.2 Peer nominations and social network analysis
An adjacency matrix per item, where group members are represented as both rows (nominators) and columns (nominees) in the matrix (e.g., Excel sheet). Group member *i*'s nomination of group member *j* appears in cell *ij* of the matrix. For many network ties, self-nominations (e.g., of trust or liking) are meaningless and for that reason the matrix diagonal is left blank. This basic format allows use by different social network analysis programs. See Appendix 2.

The item number has to appear in the output. If possible, the names of the group members are replaced by a code. In that case, a list with codes and corresponding names is needed.

Individual group members who did not take part, can still be nominated by others. It has to be clear which group members did participate but answered "nobody" and which participants did not participate. This can be done by giving nonparticipants a different code,[12] or by

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[11] The outdegree can be used to detect outliers (e.g., participants who nominate many classmates as best friends) and to calibrate item difficulty or item weight (Mpofu et al., 2006).
[12] Because nonparticipants can receive nominations, it is possible to examine potential differences between participants and nonparticipants. For that reason, it is better not to remove nonparticipants from the adjacency matrix. Nonparticipants can be removed from the database at a later stage.

indicating missing nominations by a specific code (e.g., 99 or blanc). Marjolijn has to inform which option is preferred.

2.3 Peer ratings and standard statistical analysis

The average of all received ratings for each child and item.

2.4 Peer ratings and social network analysis

An adjacency matrix per item, where group members are represented as both rows (raters) and columns (ratees) in the matrix. Group member *i*'s rating of group member *j* appears in cell *ij* of the matrix. For many network ties, self-ratings (e.g., of trust or liking) are meaningless and for that reason the matrix diagonal is left blank. An example of such a matrix is shown in Appendix 3.

The question number has to appear in the output. If possible, the names of the group members are replaced by a code. In that case, a list with codes and corresponding names is needed.

Individual group members who did not take part, can still be rated by others. As for peer nominations, nonparticipants can receive a code or their ratings could be coded as missings.

2.5 Paired comparisons and standard statistical analysis[13]

Each time a group member is chosen from a pair, that group member is given one point. Each respondent's choices are summed to obtain a rank order of peers.

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[13] Unfortunately, it has not been possible to implement pairwise comparisons in Qualtrics.

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Appendix 1: Examples of names and sex of pupils in a classroom (for designing purposes)

Code	Name	Sex
1	Christine van Beuningen	Female
2	Gerlinde Boekhold	Female
3	Duco Brinkman	Male
4	Sylvie Essanovica	Female
5	Bas Glabbeek	Male
6	Dirk Hartez	Male
7	Jacky Hogenbrug	Female
8	Sjors Luijten	Male
9	Danny Kasteels	Male
10	Lisa Kuipers	Female
11	Tanja Nieuwkoop	Female
12	Peter Oosterbeek	Male
13	Tinka den Oudsten	Female
14	Bibi Peterszoon	Female
15	Alex van Petten	Male
16	Wieger van Roermond	Male
17	Famke Rozewater	Female
18	Nancy Rozewater	Female
19	Youran van Slagmaat	Male
20	Tim Smith	Male
21	Timo Stoker	Male
22	Florence Uittenwaal	Female
23	David Visserman	Male
24	Lisa de Vos	Female
25	Tony Voskuil	Male
26	Luca van de Zanden	Male

Appendix 2: Example of an adjacency matrix of peer nominations for a classroom with 24 pupils (A-T)

Datum   1-3-2019

School   School x

Klas   6a

1.1.1   Weet jij kinderen in de klas die zo gepest worden, dus die geschopt of geslagen of geknepen worden? Kun jij mij de namen noemen

Question   Wie zijn dat dan?

PupilID	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	Total (Outdegree)
A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
B	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
C	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	1	0	4
D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
H	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
J	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1

																				Total
L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Q	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	3
S	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3
T	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Total (Indegree)	4	1	0	0	0	0	0	0	2	0	0	0	1	1	0	13	0	2	0	24

Group member i's nomination of group member j appears in cell ij of the matrix (nominators in rows; nominees in columns)

Appendix 3: Example of an adjacency matrix of peer ratings for a six-member syndicate (from Kennedy et al., 2005)

```
            1  2  3  4  5  6
            -  -  -  -  -  -
  1 N101    -  3  3  2  5  4
  2 N102    4  -  3  3  5  5
  3 N103    2  5  -  4  4  4
  4 N104    3  3  3  -  3  3
  5 N105    2  4  2  3  -  4
  6 N106    4  5  4  4  5  -
```

Group member i's rating of group member j appears in cell ij of the matrix (raters in rows; rated group members in columns).