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# Children as Respondents in Survey Research: Cognitive Development and Response Quality.[1]

by

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**Résumé: Les enfants comme répondants dans les enquêtes – Développement cognitiv et qualité des réponses.** Quoique les enfants ne sont plus une population négligé des statistiques officièlles et des enquêtes, des études méethodologiques sur des enquêtes d'enfants sont rares. Les chercheirs doivent se baser sur les connaisances *ad hoc* venant des domaines aussi divers que la psychiatrie enfantine et les test d'éducation, ou extrapoler à partir de la connaisance méthodologique associée aux enquêtes auprès d'adultes. Dans cet article, les auteurs passant en revu la littérature scientifique disponible sur les enfants comme répondants, et présentent les résultats préliminaires d'une analyse secondaire de l'influence du développement cognitif sur la qualité des réponses. Enfin, il y a des recommandations concernants les enquêtes des enfants. **Enfants, Développement cognitif, Qualité des données, Questionnaires, Entretiens.**

**Abstract**. Although children are no longer a neglected minority in official statistics and surveys, methodological knowledge on how to survey children is still scarce. Researchers have to rely mainly on ad-hoc knowledge from such diverse fields as child psychiatry and educational testing, or extrapolate from methodological knowledge on how to survey adults. In this article we review the available literature on children as respondents, and present the first results of a secondary analysis on the influence of cognitive development on response quality. We finish with recommendations for surveying children. **Child, Cognitive growth, Data quality, Questionnaires, Interview.**

## INTRODUCTION

Society is becoming more and more concerned with children's issues and there is an increasing interest in children's rights. In most of the western world, it is now recognized that children have a voice that should be heard and there is a new demand for research that focuses

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on children as actors in their own right (cf. Scott, 1997). As a consequence, survey researchers are realizing that information on children's opinions, attitudes, and behavior should be collected directly from the children; proxy-reporting is no longer considered good enough. Official governments agencies, such as Statistics Canada, Statistics Sweden, and the British Economic and Social Research Council, now acknowledge children as respondents and have developed and implemented special surveys for them. Also, academic research institutes and health organizations realize the need for accurate data directly collected from children on their perspectives, actions, and attitudes. However, methodological knowledge on how to survey children is scarce.

The Handbook of Social Psychology, 1954, contains a chapter on interviewing with a fascinating subsection on interviewing children (Maccoby & Maccoby, 1954). Later handbooks presented many other chapters on data collection and the survey interview, but did not mention children. It took more than forty years before a chapter about children as respondents appeared in a handbook again (Scott, 1997). In between, a few articles were published scattered over various disciplines, and researchers had to rely on ad-hoc knowledge from such diverse fields as child psychiatry and educational testing.

For surveys of the general population, procedures to enhance response quality and the improvement of data collection methods are well documented (cf. Groves, 1989; Biemer et al., 1991; Lyberg et al., 1997). Still, even surveying the general population is far from simple, and extensive attention has been given to the question-answer process involved. Important steps in the question-answer process are (1) understanding the question, (2) retrieving relevant information from memory and 'computing' an answer, (3) formatting the answer (e.g., choosing the appropriate response category), (4) evaluation of the answer (e.g., editing due to social desirability or situational adequacy may take place), and (5) communicating the final answer (cf. Tourangeau & Rasinski, 1988; Schwarz & Sudman , 1996).

In the last decade, special attention has been given to the tailoring of survey methodology to elderly respondents (Herzog & Rodgers, 1992), and the influence of the declining cognitive ability of elderly respondents on data quality (e.g., Andrews & Herzog, 1986; Colsher & Wallace, 1989; Knäuper et al, 1997). Like aging, growing-up involves changes in cognitive functioning, but in this case a positive change. Over time children's cognitive abilities improve, and they will be able to understand more and more.

Methodological studies on adult populations have shown that adults may experience problems with certain questions, and that question characteristics may affect the data quality in surveys (for an overview, see Krosnick & Fabriger, 1997). Especially when questions are very complex and/or when information has to be retrieved from memory, adults experience problems (Eisenhower et al, 1991). With children as respondents, the same problems may be magnified, as a slight error (e.g. ambiguity) in the questionnaire is more difficult to compensate, or has a larger impact. Also, children may experience specific problems when responding. The cognitive, communicative and social skills are still developing and this affects different stages of the question-answer process.

In this article, we first discuss the different stages of cognitive growth and their consequences for surveying children. In that section, we review the available studies on children as respondents. We then continue and present the first results of a study on the influence of cognitive development on response quality in questionnaire research with children. We used a meta-analytic approach and re-analyzed data-sets of studies that used questionnaires with children as respondents. We conclude with some practical recommendations for surveying children.

## DEVELOPMENTAL STAGES AND THEIR RELEVANCE FOR SURVEYING CHILDREN

### Cognitive development

Children develop, and learn new skills in the process. This makes it impossible to give a single fail-safe recipe to survey all children. In surveying the elderly one often distinguishes between elderly and elder elderly. A global classification of developmental stages of children will be equally helpful in surveying children, and Piaget's (1929) theory of cognitive growth provides a useful tool. According to Piaget, children's intellectual development evolves in a fixed sequence of stages. These are: (1) *Sensory-motor intelligence*, from birth until about 2 years, (2) *Preconceptual thought*, from 2 till 4 years, (3) *Intuitive thought*, from 4 till 7-8 years, (4) *Concrete operations*, from 8 till 11, and (5) *Formal thought*, which develops between 11 until 15-16 years of age. From the age of 16, the cognitive capacities are, in general, fully developed.

Piaget's theory has been criticized and amended: the stages tend to overlap and the boundaries are more fuzzy than Piaget claimed. Also, at any specific age, children's abilities vary, depending on heredity, learning, experience, and socio-environmental factors. However, children's cognitive capacities do clearly increase with age, and the basic levels of cognitive development are extremely important for understanding the question-answer process when studying children, and for discovering where children may differ from adults (cf. Scott, 1997). Therefore, Piaget's theory is very useful for survey researchers, and we will use Piaget's developmental stages as a general framework for our literature review on surveying children. One should keep in mind that the stages should not be seen as sharply distinct categories, but rather as a moving scale. There are differences within groups, and there may be overlap between the groups.

### The question-answer process and developmental growth

As stated before, the question-answer process is central to a successful survey. When surveying children, one should realize that the cognitive growth of children has profound implications for the question-answer process. The stage of development of a child will in fact influence their performance on each of the tasks involved in answering a question. The children first have to understand the question, determine the intended meaning. In the second step they have to retrieve relevant information from memory, and use this to come to a tentative answer. Then they have to formulate the answer, either by choosing the appropriate response category, or by actively verbalizing their thoughts. In between, evaluation of answers (e.g., editing due to social desirability or situational adequacy may take place). For, instance, children will behave differently before their teachers, their parents, and peers. In the next sections, we discuss for each stage of development its influence on the question-answer process.

### Early stages of development: from sensori-motor skills to intuitive thought

Until approximately 4 years of age (developmental stages 1 and 2), language and thought processes of children are still limited, and it would be unwise to interview them. Their language is tied to actions and desires, as in naming (e.g., ‘dog’ or ‘rwaf’ for dogs or similar

animals). In pedagogical and child research one mainly uses observation methods for these age groups, or asks parents to report.

From 4 years onwards, children can be interviewed, but not easily. One can employ qualitative interviews with 'playing' tasks, or short structured interviews. Also, one can form small 'focus' groups, like the 'round circle' in preschool. However, one should take extreme care in the formulation of the questions and the evaluation of the answers.

The group from *4 until 7 to 8 (Intuitive thought)* are developing the basic skills necessary for a successful verbal exchange. Of course, there is a large difference between a four and a seven year old. But the group as a whole is still limited in its language development, which implies limitations in comprehension and in verbal memory. Verbal comprehension and verbal memory are extremely important in the first two steps of the question-answer process: understanding the question and retrieval of relevant information from memory. Questions should be very simple and clear. Question wording is extremely important, researchers should first try to learn which words the child itself uses, these words should be then used for the questions.

A second problem is that children in this age group are very literal. For instance, when asked if they had been on a school field trip, the answer was "no", since they had been on a *class* field trip (Holoday & Turner, 1989). Also, so called 'depersonalized' questions or indirect questions (e.g., most people, people my age) can cause problems. This literal interpretation of questions persists with older children, and makes one fear the worst for adults. For instance, in the British Youth Person's Survey (11-16), the researchers wanted the respondents to answer for people of their own age-group and used the phrase 'people of my age' in the question. However, in the pilot pretest it was discovered that some of the young respondents tried to guess the age of the interviewer who read out aloud the questions! (Scott, Brynin, & Smith, 1995).

A third problem is that young children (4-7) are very suggestible, they will laugh, nod, or say yes, just to please and go-along. Also, they are often reluctant to express their own thoughts or feelings, because young children often assume that the adult knows everything already, and in addition they are afraid to say something wrong or foolish (Maccaby & Maccaby, 1954). This has serious implications for step 4 (evaluation of answer) and 5 (communication) of the question-answer process.

Finally, children in the 'intuitive thought' group still have a very short attention span, and easily loose interest. This has consequences for the reliability of answers; children are more likely to use 'satisficing' approaches and response sets when they are not very concerned by, or interested in the topic (Vaillancourt, 1973).

**Concrete operations**

The developmental stage from 8 to 11 is labeled *development of concrete operations*. In this period, language develops and reading skills are acquired. These children also start to distinguish different points of view (self vs. others), but this is far from perfect. They begin to learn classification and temporal relations, but they still do have problems with logical forms; for instance with negations. They also are still very literal in the interpretation of words, and experience the same problem as younger children with 'depersonalized' or indirect questions.

From 8 years onwards, children can be surveyed. One can use semi-structured interviews for individuals and small groups, and one can use structured interviews. This is also the age on which educational researchers start with self-administered tests in the classroom. Of course, questionnaires have to be specially developed for this group, one cannot

use the standard questionnaires used for adults. Van Hattum & De Leeuw (1999) report on a successful Computer Assisted Self-Administered Interview (CASI) in this age group. But it is not easy to survey this age-group successfully. Researchers should design the questionnaire very carefully, and be fully aware of the fact that language is still developing, and that the children are only just acquiring reading skills. Language skills, especially understanding language, are very important for data quality. We will go into this in more detail in section 3.

In writing questions, one should be very careful with the wording. One should expect problems with questions that use negations (Benson & Hocevar, 1985; Marsh, 1986), and it is advisable not to use negatively phrased items. This is contrary to the general practice with adults, where one often uses equal numbers of positive and negative statements in ratings or psychological tests to avoid response sets, such as yeah-saying. Ambiguity in questions, either in the question itself or the response categories (e.g., vague quantifiers), also has a strong effect on data quality, especially in younger children. Young children have far more difficulty with ambiguous speech, and often fail to distinguish between what is said and what is meant (Robinson, 1986). The same effect is found in self-administered written questionnaires and educational testing. Elder children (14 years) cope far better with ambiguous questions than younger children (9 years), although it should be emphasized that ambiguous questions are difficult for all respondents, even for adults (De Leeuw and Otter, 1995).

When interviewing or testing children in the age group 8-11, one should also be still be aware of satisficing and other problems that originate in a lack of concentration or motivation. Satisficing is using a simple heuristic to give an answer, instead of going through the complete question-answer process. Children tend to use satisficing techniques (e.g., response sets) when they find the subject uninteresting, or when they are unsure of the meaning of the question (Holaday and Turner-Henson, 1989). Especially with long questionnaires, lack of motivation and difficulties in keeping up concentration will result in poorer data quality. Computer Assisted Self-Interviewing (CASI) could help. With the help of a good computer program, one can make questionnaires look simple and attractive. Also, mistakes like involuntary skipping a question, can be avoided. Van Hattum & De Leeuw (1999) compared the data quality in computer assisted self-administered questionnaires (CASI) with that of paper and pencil self administered questionnaires (PAPI) for pupils in primary schools. The mean percentage of missing data was 5.7% for the CASI -group versus 14.1 % for the PAPI group. Even more interesting was that the standard deviation was 3.4 % versus 25.0% , indicating far less variability in the CASI-group. In a paper questionnaire, a child can easily skip a question or a whole page when by mistake or by intention when bored.

**Formal thought**

The developmental stage from 11 to 15-16 is labeled development of formal thought. Cognitive functioning is well developed in this stage (e.g., formal thinking, negations, logic) and also social skills are developed. But children in this age-group are very context sensitive, and they may have their own norms. For instance, the same child can be very shy and quiet at school, and very boisterous and talkative at home. This can have an important influence on data quality, especially on openness in answering questions.

One can use standardized questionnaires similar to those for adults, and several large scale surveys have been successfully implemented for this age group (e.g., USA longitudinal survey of youth, British household panel, British social attitudes study). Standard data collection can be used, but one must be aware of certain problems. Face-to-face interviews have the main advantage of interviewer aid and visual aids, but may suffer from serious

problems caused by the presence of others (parents, siblings). During telephone interviews one should take extreme care to keep them motivated, and be extremely careful regarding the number of response categories used. Often self-administered questionnaires are used in a school room setting for this group. Again, one should be aware of the potential context effects on the answers and the influence of classmates. Also, lack of motivation and boredom can negatively influence the data quality. Making the task more interesting and the use of CASI could offer a solution here.

The age group 11-16 has been extensively studied by Scott and her colleagues at the Economic and Social Research Center in the UK. Using an adapted questionnaire approach, they were able to successfully incorporate this group in their ongoing panel on micro-social change. When the young panel members reached the age of 16, they became automatically adult members. (Scott, 1997; Scott, Brynin, and Smith, 1995). Scott advises to be aware of potential problems with literacy, context, and confidentiality. In fact, they successfully used a combination of a self-administered paper questionnaire and a walkman with the spoken text of the questionnaire. This method was pioneered in the USA at the National Center for health statistics in 1991 (cf. Scott, 1997). It was also found that graphical and visual questions (e.g., faces for the measurement of happiness), worked extremely well in this age group (Scott, et al, 1995). Finally, one should guard against standard question comprehension problems and ambiguity, and flippancy and boredom. Therefore, extensive pretest are advised and described in detail by Scott et al. (1995) and Scott (1997).

### From 16 years on

From 16 years onwards, children are more or less treated as standard adults in surveys. For instance, in the British household panel, adult members are defined from 16 onwards. However, one should take some care. Regarding their cognitive development, they may be considered adults, but one should always be aware of potentially different group norms or specific social norms. The social context of the survey (e.g., classroom, presence of siblings or friends, type and age of interviewer) can be important, especially in interaction with special topics (e.g. health, social networks). For example, there is some anecdotal evidence from a survey on drugs in Germany, that teenagers were far more open to elderly female interviewers, and not to the young or youngish interviewers. Especially with sensitive questions the context or interview situation may have a strong influence as Beebe et al (1998) showed. In a study on illicit drug use among high school students, Beebe found that student proximity influenced the openness of the answers.

For young adults, it is advisable to carefully analyze the group and not treat them routinely as adults. Extra attention and special precautions are necessary when surveying special topics (cf. De Leeuw and Collins, 1997).

## INFLUENCE OF COGNITIVE DEVELOPMENT ON DATA QUALITY

### Influence of reading skills

Borgers (1997) conducted a small scale study in which she reanalyzed data that were collected for the evaluation of a reading stimulation program. Available were data on 443 children from level 4 of Dutch primary schools (age 7-8). All children completed a reading attitude test, that consisted of 25 questions with two response categories (one positive, one negative). Data

collection took place in the classroom, where the questions were read out aloud by an instructor, and the children recorded their answers on a self-administered questionnaire. This method is comparable to the combination of walkman/SAQ that Scott (1997) used.

Available as background data were also the individual scores on several educational tests (i.e., vocabulary, reading decoding, and two tests for reading comprehension) and whether Dutch was the child's native or second language. Based on the background data , four group scores were assigned, indicating whether a child was a good performer on a specific test (above the median) or not (below the median). The groups were then compared regarding the quality of the data on the reading attitude test.

Two data quality indicators were used, all based on the reading attitude scale data. These indicators are the psychometric reliability or internal consistency (Cronbach's coefficient alpha) of the reading attitude scale, and the item nonresponse on the reading attitude scale. For a thorough discussion of psychometric indices as indicators for data quality in survey research, see De Leeuw (1992).

A multiple group significance test according to Hakstian and Whalen (1976) showed that only children who scored low on the two tests for reading comprehension had a significantly lower data quality on the indicator psychometric reliability. The average difference in coefficient alpha was 0.06 (0.77 vs. 0.83 ). The children's scores on the vocabulary test and the reading decoding test did not have any significant effect. Nor did the variable 'Dutch as a second language' have any effect.

With regard to the indicator item-nonresponse, all reading tests showed a marginally significant effect. On average children that scored low on the reading tests, had a higher mean number of items missing on the attitude questionnaire than children that scored high in reading ability (0.34 vs. 0.16). This means that in the low ability reading group about one in three children had at least one missing value on a 25 item attitude scale, while in the high performing reading group only one in six children had a missing item. Again, whether or not Dutch was the children's native language did not have any effect.

In sum: Reading ability in general (vocabulary, reading decoding, and reading comprehension) did influence the item nonresponse on an attitude questionnaire. Children with low reading scores produced more missing data. How well the children could understand what they are reading (reading comprehension) influenced the consistency of their responses on the attitude test. The more technical aspects of reading (vocabulary, reading decoding) did not have any effect. It should be noted that the questions on the attitude test were presented to the children auditory (read out aloud) to prevent potential influences of literacy. Still, the scores on reading tests and especially on reading comprehension, did influence the data quality on this *auditively* presented attitude test. We assume, that it is *language ability*, and not reading ability that is at work here. Children with more developed language skills, understand the questions better (step 1 in the question-answer process), and therefore produce better quality data.

## Influence of Child Characteristics

In a second more elaborate study, Borgers, De Leeuw, and Hox (1999) investigated the influence of child characteristics and cognitive growth on data quality when surveying children. Using meta-analytic techniques they reanalyzed questionnaire data with children as respondents. Available were three large data sets. All data were collected in a class room setting, using self-administered paper questionnaires developed for children. The studies

included different age groups and were aimed at different topics, asking for different types of information, ensuring generalizabilty.

Available for analysis were in total 29 multi-item scales. No direct measures of cognitive development, such as psychological tests were available. Often used proxy variables for cognitive development are gender and age or year of education. In general, girls develop somewhat quicker than boys, especially in language skills (cf. Cherry and Lewis, 1978). Therefore, it was expected that girls would produce slightly better quality data, irrespective of age. When children grow older, they also acquire more abilities. This was the second hypotheses tested by Borgers et al (1999) in their meta-analysis.

In the re-analyses of the data sets two common indicators of response quality were used as dependent variables. The first was Cronbach's alpha, the internal consistency of the answers on multi-item scales. The second, a measure of item nonresponse, in this case proportion item-non response on the scale. The results were combined using meta-analysis, resulting in a weighted average for coefficient alpha (cf. Hedges and Olkin, 1985; Schwarzer, 1989).

Borgers et al (1999) were able to show that both gender and year of education had an influence on the internal consistency of the scales. The average coefficient alpha, combined over the scales, was 0.78 for girls and 0.77 for boys (p=.03). With regard to year of education, a clear trend was discovered. Young children (9-10), who are still in the beginning of school, produce the less internal consistent responses on scales (average coefficient alpha over scales= 0.65). This steadily increases. At 11-12 (year 8) , the average coefficient alpha increases to 0.70. The trends stabilizes at school year 11 (around age14-15), the combined coefficient alpha is then 0.83.

With regard to the proportion item-nonresponse, the association with gender was significant in the predicted direction (combined r= -.02). Boys have slightly more item nonresponse than girls. There also is a significant effect of year of education (combined r= -.03). Young children, in the early years of education, produce more item nonresponse (Borgers et al, 1999).

In sum: Both gender and year of education did influence the item nonresponse and the internal consistency (coefficient alpha) on a large number of different multi-item scales. This supports the hypothesis that data quality increases with cognitive growth. It should be noted that the effect sizes are small, and that even the relatively young children (9-10 years) were able to reply to the questions in a reasonable reliable way. For more details, see Borgers (1998), and Borgers et al (1999).

## CONCLUSIONS AND RECOMMENDATIONS

Surveying children does pose distinctive methodological problems. But only when we direct our questions to the children themselves, will we be able to understand the children's social world. Children should be taken seriously and methodological effort should be aimed at improving data quality. When surveying children, special attention should be paid to questionnaire construction, and questionnaires should be thoroughly pretested. Scott (1997) advises qualitative in-depth group discussions prior to questionnaire construction. After the development of the questionnaire, both questions and instructions should be pretested using cognitive pretest methods to probe how the question is understood and why a particular answer is given. For an introduction into cognitive pretesting see the special issue of BMS (Campanelli, 1997).

A well designed and tested questionnaire is a prerequisite for good data quality, but a quality survey of children needs more. Each age group has its special problems, and one should tailor the total survey design to the cognitive and social development of young respondents. Based on the literature review presented in this article, the following recommendations can be made.

First of all, one should not try to interview very young children who are still in the preconceptual thought phase (younger then 4). For this group one should rely on observational data and/or information from proxy respondents (e.g., caretaker of child). When language develops, one can start collecting data from the child itself. However one should take the cognitive development of different age groups into account.

From a*ge 4 to 7 (intuitive thought)* children can be interviewed, but one should take extreme care. Although there is a large difference between a 4-year old and a 7-year old, this group as a whole has still a very limited language and is very suggestible. However, short qualitative open interviews or simple structured questionnaires can be used. These should be presented as a game and incorporate 'playing' tasks. Small focus groups, like the round circle in preschool, are also possible. One should be careful to use the child's own words, and be aware of too literal answering. Furthermore, there is an extreme danger of suggestibility.

In the age group *8-11 (*concrete operations), language and reading skills are sufficiently developed to use individual or group semi-structured interviews, structured interviews, self-administered group tests, or even computer-assisted self-interviews. We found that in a range of different questions, children of this age can answer well designed questions with some consistency. The older the children are, and the better the children are in understanding language (reading with understanding), the better the data quality. But one should take many precautions and take care to write appropriate questions and test the questions. For instance, young children have problems with negatively phrased questions, and have absolutely no tolerance for ambiguity (Benson and Hocevar, 1985; De Leeuw and Otter, 1995). When preparing the questionnaire, one should take care that both questions and instructions are simple, and that the wording is clear and unambiguous. One should also avoid negations. If possible, one should use visual stimuli and response cards, to make the task more concrete and interesting. Response cards are also very helpful, as young children tend to forget even a limited set of response options. Most important of all, one should pretest and pretest again. Very small errors in question formulation are not easily compensated and can be amplified to large effects. Finally, one must be aware of satisficing through loss of concentration and motivation (cf. Holaday and Turner-Henson, 1989). Keep tasks short and make them attractive. Computer-assisted data collection may help (cf. Van Hattum and De Leeuw, in press), audio and video opportunities may help to get and keep attention too.

*Age 11-15* (formal thought). Cognitive functioning is already well developed in this group. We found that children around 11 already can give consistent answers, this still improves with age and finally stabilizes around 14. It is then possible to use standardized questionnaires similar to adults, but a very thorough pretest is necessary. One should guard especially against ambiguity of question wording, too literal meanings, and ambiguity (cf. Scott, 1997). Scott also advises to be wary of potential problems with context effects and confidentiality. Both the nearness of school-mates or siblings and parents can influence the answers dramatically. More confidential methods, such as self-completed questionnaires and computer assisted self-interviewing can help. Again, both audio and visual presentation of the questions (e.g., questionnaire + walkman, audio-CASI), may be useful to keep the attention and to avoid literacy-problems with special groups. But above all, one should keep this group motivated and guard against flippancy and boredom.

From 16 years on, children are more or less treated as adults in surveys. Regarding their cognitive growth, they can be considered as adults, but one should be aware of specific

social norms and different group norms. The context of the survey may be important, especially when special topics are researched. One is well advised to carefully analyze the group and the group norms and to use the standard precautions when surveying special groups (cf. De Leeuw and Collins, 1997). And above all, do not forget to pretest questionnaire, instructions and total survey design.

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