Higher data quality in web probing with EvalAnswer: a tool for identifying and reducing nonresponse in openended questions

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Summary

EvalAnswer is a tool for automatically detecting different types of nonresponse in answers to open-ended questions. It was specifically developed for use in web probing procedures but it can be used in any online survey that asks open-ended questions. EvalAnswer automatically detects and codes cases of nonresponse and suggests follow-up questions which are tailored to reduce nonresponse. Once implemented in a survey, researchers have a powerful survey aid that helps to automatically increase data quality during the interview process by eliciting better answers to open-ended questions. Furthermore, the tool can be used in the post-processing of answers after data collection. The tool can be adapted to be used in one's own survey. This paper describes the survey methodology that led to developing the tool and it gives details on its validity and effectiveness.

Additional online resources:

Video showing how web probing works with the tool EvalAnswer:
http://kaczmirek.de/webprobing/video

Demonstration and test environment: http://kaczmirek.de/webprobing/demo

Source code for the tool EvalAnswer and project file for import in the online survey software tool questback EFS: https://git.gesis.org/surveymethods/evalanswer

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1   Nonresponse in open-ended questions, its detection, and strategies to reduce it

Open-ended questions in web surveys are prone to item nonresponse for two reasons: First, open-ended questions are cognitively more demanding than closed items since the respondents have to formulate their answers in their own words and cannot rely on answer categories as an additional interpretation aid for the survey question (Dillman, Smyth, and Christian 2009). Second, the risk of item nonresponse is even higher in the web mode than in a face-to-face interview situation since the motivational impact of an interviewer is missing (Meitinger and Behr 2016) and respondents need to take the additional effort of typing their answer, which can be a demanding task in itself.

These shortcomings of open-ended questions call for efforts to reduce item nonresponse. Nonresponse reduction is not straightforward, however, given that numerous possibilities of item nonresponse exist. In contrast to closed items where respondents either refuse to tick an answer option or select the "Don't know" category, nonrespondents at open-ended questions can refuse to enter any text, they can give answers that contain random letter combinations (e.g., "fgfgfg", "ghfljhflj"), don't know responses (e.g., "no idea"), refusals (e.g., "no comment") or meaningless or incomprehensible answers (e.g., "just cause," "great") (Holland and Christian 2009; Behr et al. 2014). The variety of possible nonresponses means that nonresponses in open-ended questions are harder to detect than in closed items and, so far, responses had to be coded manually – and *after* data collection – to identify or sort out cases of item nonresponse.

However, if one aims at reducing item nonresponse *during* a survey, an automatic detection of cases of item nonresponse is necessary to subsequently convert nonresponses into substantive responses at open-ended questions with the help of follow-up questions. Previous research showed that motivational statements (e.g., Smyth et al. 2009; Zuell et al. 2015) can reduce item nonresponse at open-ended questions. Motivational statements can also be combined with follow-up questions (Oudejans and Christian 2009), which means that respondents receive a repetition of the original open-ended question along with a motivational statement after submitting a nonresponse to the original question. In the study by Oudejans and Christian (2009) all respondents received the same question twice. In contrast to this, we use motivational follow-up questions only if the first answer lacks sufficient information. Since open-ended questions increase the response burden, only nonrespondents should receive these motivational follow-up questions to avoid that respondents receive too many open-ended questions and get frustrated or, even worse, break off.

2 Applications

An implementation of the EvalAnswer tool in web surveys can facilitate the research process in at least three different scenarios. 1) As already mentioned, EvalAnswer can detect instances of nonresponse in open-ended questions *while* the respondent is answering the questionnaire. By repeating the initial open-ended question along with a motivational statement, the tool can reduce the nonresponse rate of open-ended questions in web surveys. 2) Once the data have been collected, the tool can speed up the data cleaning process since nonresponses are more easily detectable. Therefore, the researcher can faster begin the actual data analysis with a subset of only substantive responses. This feature might be in particular interesting for research projects that have to analyze open-ended data on tight deadlines. In a commercial context, this tool might help to speed up delivery of cleaned data sets with only substantive responses to the client. 3) Finally, for providers of online panels, EvalAnswer might help to identify panelists that tend to refuse answering open-ended questions. If the panel provider is aiming at a high-quality panel with rich open-ended answers, EvalAnswer can help to exclude these refusing respondents to increase the overall quality of the panel.

To summarize: EvalAnswer may prove useful in the following scenarios:

1. to evaluate answers on the fly in an online survey and trigger follow-up questions;
2. to autocode answers after data collection;
3. as a screen-out tool in the profile survey (entry survey) of an online panel. If respondents do not provide satisfactory answers, they cannot enter the panel.

3   Description of EvalAnswer

We developed EvalAnswer in three languages (English, German, and Spanish). The tool can detect instances of nonresponse in open-ended questions and automatically trigger a follow-up question with a tailored motivational statement. The tool is based on regular expressions[1], which means that a large number of nonresponse variations can be detected and potentially converted into substantive responses. When the tool is implemented in an online survey software (we used questback EFS to implement the tool in our online research), each respondent that either answers too fast (<2 sec.), does not write any text (empty text box), or where the response matches a regular expression, receives an automatic repetition of the original open-ended question along with a motivational statement. Any respondent who either provides an answer that is longer than 50 characters or that does not trigger any regular expression will not receive a motivational follow-up. We roughly distinguish between seven categories of nonresponse in this context (see Table 1).

Table 1.   Categories of Nonresponse

Category	Type of Nonresponse
Category 1	**Complete nonresponse:** respondent leaves a blank text box
Category 2	**No useful answer:** response is not a word e.g., "dfgjh"
Category 3	**Don't knows:** e.g., "I have no idea," "DK," "I can't make up my mind"
Category 4	**Refusals:** e.g., "no comment," "see answer above"
Category 5	**Other nonresponse:** responses that are insufficient for substantive coding: e.g., "my personal experience," "it depends," "just do," "just what it is"
Category 6	**One word only:** respondent just writes a single word, e.g., "economy"
Category 7	**Too fast response:** Respondent takes less than two seconds to answer

We further distinguish between several subcategories that cover different aspects of each nonresponse category. For a detailed list of subcategories along with their regular expressions, see **Fehler! Verweisquelle konnte nicht gefunden werden.**. So far, we have developed 38 subcategories for the five general categories (1-5) but the number of technical distinctions (the amount of different regular expressions) exceeds the number of subcategories since each subcategory is measured by several regular expressions. Additionally, in questions where an answer that consists of only one word is not enough information we can treat one-word answers as nonresponse (category 6). Finally, category 7 classifies respondents whose answers seem too fast compared to the minimum time needed to process the question. Since the tool was first developed in German, the German version is the most refined version and has the most technical distinctions (74 regular expressions). Although the English and Spanish versions were developed at a later stage than the German version, they still capture a high level of detail (English: 69 regular expressions, Spanish: 47 regular expressions).

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[1]   A regular expression is a string which defines a (potentially complicated) search pattern. See also
      http://www.regular-expressions.info/

Since respondents in each category are likely to have different motivations for giving a nonresponse (e.g., fast respondents might have a different motivation than "Don't know" respondents to provide a nonresponse), we developed different motivational statements that specifically target the different "obstacles" that are associated with the seven nonresponse categories. Table 2 shows the English version of each motivational statement by nonresponse category (see **Fehler! Verweisquelle konnte nicht gefunden werden.** for the German, Spanish, and Mexican language version of the motivational statements).

Table 2.   Motivational Statements by Nonresponse Category

Category	*Motivational Statement*
Category 1	We need your answer to this question. Please take a moment to answer the question in as much detail as possible.
Category 2 & 4	We would like to understand what you had in mind when you answered the original question. Please try to answer this follow-up question:
Category 3	Please consider the question again. Your answer is very important for this research project.
Category 5 & 6	Please answer in a bit more detail. This is important so that we can understand your answer better.
Category 7	You seem to be in a hurry! Please take another moment to answer the question in as much detail as possible.

4   Development of EvalAnswer

4.1   Building regular expressions based on empirical text corpora

The regular expressions for this tool were developed based on empirical evidence. In order to build regular expressions that cover a large variety of open-ended nonresponses, we collated a text corpus with open-ended responses to various substantive topics (e.g., gender roles, xenophobia, civil disobedience, and world citizen). The initial text corpus contained 7,087 German responses (including substantive answers and nonresponses) to 17 different questions and the initial data were collected within the DFG-funded research project "Enhancing the Validity of Intercultural Comparative Surveys" (grant number BR 908/3-1). With each survey in our project, we extended the text corpora and revised and improved our regular expressions. In addition to the German version, we also developed and revised English and Spanish regular expressions for this tool. We discussed the developed regular expressions and their categorization within the research team and pretested their functioning with the website: www.regexpal.com.

Table 3. Number of Responses per Text Corpus and by Language.

	German	*English*	*Spanish*
Initial text corpus	7,087	n.a.	n.a.
Text corpus after first revision and extension to English and Spanish	9,712	2,973	1,915
Text corpus after second revision	9,712	7,281	5,128

Note. The table shows how the three text corpora have grown over time with each additional survey.

4.2   Testing and improving regular expressions

Besides the pretesting of the regular expressions as such, we also made sure that the developed set of regular expressions does not overlap (e.g., more than one regular expression applies) and does not flag false-positives (e.g., substantive responses that do not qualify as nonresponse). For this purpose, we created a STATA file for each survey which contained the corresponding text corpus. In STATA, it is possible to assess the matches of regular expressions with the STATA commands *regexs* (returns the part of the response which triggers a specific regular expression) and *regexm* (returns a "1" when a specific regular expression matches). In addition, we created a count variable that assessed whether more than one regular expression was triggered for each response. This approach allowed us to detect all regular expressions that were malfunctioning or that had an overlapping or too wide scope. After the detection of erroneous regular expressions, we revised these regular expressions and we reran the updated version of regular expressions in the STATA file. We repeated this process until there were no more erroneous regular expressions detected. We also repeated this process with each extension of the text corpus since new regular expressions were added after each extension.

4.3   Quality of the automatic coding

We compared the outcome of the tool with manually coded answers. For this, we used data that were collected in 2013 as part of the project CICOM2, study 2, in Germany. Coders were instructed to code

whether an answer was considered to be a nonresponse or a valid answer and this was compared with the outcome of the tool. We compared 14 variables, which had between 131 and 532 responses each. The intercoder reliabilities (which in our scenario are identical to the percentage of correctly coded answers by the tool when we assume that the human coders make no mistakes) were between .89 and .98. In eight variables with 131-137 responses, each on topics about national pride, intercoder reliability was between .91 and .96. In two variables with 262 and 263 responses about the topic of whether being a housewife can be just as fulfilling as working for pay, the intercoder reliability was .95 and .97. In two variables with 254 and 262 respondents about the topic of whether a working mother can establish just as warm and secure a relationship with her children as a mother who does not work the intercoder reliability was .91 and .94. In two variables with 532 respondents, each about the topic of division of work between parents, the intercoder reliability was .95 and .98. Since 2013, the tool has been developed for other languages (English and Spanish) as well and the regular expressions have continuously been refined and optimized.

4.4   Performance of the script

A performance test in 2013 (data set: CICOM2, study 2) showed that the JavaScript executes quickly within acceptable parameters. There was no evidence of any considerable slow-down of the survey process. We conclude that the script is too fast for any respondent to feel any slow-down of the survey process. 99% of all answers were evaluated in less than 30 milliseconds. The longest execution time was 514 milliseconds followed by the second longest case which took 110 milliseconds. We defined the runtime as the time between the beginning of the execution of the regular expressions and the end of the script. The main test was run on two variables with 532 respondents each. We tested how long the script took to run because, theoretically, if a complex regular expression is constructed poorly, it could take minutes or hours before it returns the results. In our examples, however, the regular expressions are simple. Further tests in the same survey on 15 other variables with 105-110 respondents per variable showed that the largest duration for execution was 75 milliseconds.

5 Implementation of the tool in online surveys and in online survey software

All programming code is available at https://git.gesis.org/surveymethods/evalanswer

We have made available all the source code that was used in the demonstration (see further below) as well as the source code for implementing EvalAnswer in questback EFS, and a questback EFS project file which you can import into your own EFS installation.

5.1 Test environment and general technical demonstration

To help you understand how the tool works and how it can be adapted to your own needs, we used the online development environment JSFiddle to set up a working example (software proof of concept) of the code in HTML, JavaScript and CSS. You can access the demonstration at http://kaczmirek.de/webprobing/demo. English, German, and Spanish answers can be evaluated. You can select the language in the JavaScript area under the code section "/* SETTINGS SECTION */". There you can also decide whether you want to follow-up on single-word answers (default) and whether you want the tool to select tailored follow-up requests (default) or a general (one-fits-all) approach. In principle, you can also change other settings such as the threshold length that determines a valid answer (i.e., long answers are never followed up, default is a minimum response length of 50 characters) and what constitutes a too fast answer (response times for an open-ended answer that is below 2000 milliseconds are by default always followed up). However, we do not advise to change these settings as the default values have been tested with thousands of respondents in several international surveys.

5.2 Implementation in the online survey software questback EFS

If one wishes to use the tool in an online survey with the online survey software questback EFS, the following short guide may assist you in the set-up process. We also created a video showing EvalAnswer in action in questback EFS: http://kaczmirek.de/webprobing/video.

In order to implement our tool in EFS, you need some knowledge in HTML and JavaScript. Regarding EFS, you need to know how to implement common question types, user-defined questions (type 911), and filters.

There are various ways how you could make this work. One approach would be to implement the JavaScript code only on the specific pages where you need nonresponse conversion. This is a good idea if you only need it for some questions. We explain how this can be done in the following section. Another approach would be to use the template system of EFS. This would make the functions that are used to detect and reduce nonresponse available throughout in the survey. Using a template can be more efficient if your survey has many open-ended questions.

First, take a look at our online video or Appendix B

German, Spanish, and Mexican version of the motivational statements

Table A1.　　　German version of the motivational statements

Category	Motivational Statement
Category 1	Wir benötigen hier Ihre Antwort. Bitte nehmen Sie sich ein wenig Zeit, um die Frage so ausführlich wie möglich zu beantworten.
Category 2 & 4	Wir würden gerne verstehen, was Sie bei der Frage gedacht haben. Bitte bemühen Sie sich, die folgende Nachfrage zu beantworten.
Category 3	Bitte denken Sie noch einmal nach. Ihre Antwort ist sehr wichtig für dieses Forschungsprojekt.
Category 5 & 6	Bitte antworten Sie etwas ausführlicher. Dies ist wichtig, um Ihre Antwort besser zu verstehen.
Category 7	Sie haben es aber eilig! Bitte nehmen Sie sich ein wenig mehr Zeit, um die Frage so ausführlich wie möglich zu beantworten.

Table A2.　　　Spanish version of the motivational statements

Category	Motivational Statement
Category 1	En este punto necesitamos su respuesta. Por favor, tómese un poco más de tiempo para responder a la pregunta del modo más detallado posible.
Category 2 & 4	Nos gustaría saber en qué Ud. ha pensado al contestar a la pregunta inicial. Por favor, trate de contestar a la siguiente pregunta adicional:
Category 3	Por favor, tómese un momento de reflexión. Su respuesta es muy valiosa para este proyecto de investigación científica.
Category 5 & 6	Por favor, responda más detalladamente. Es importante para entender mejor su respuesta.
Category 7	¡No tenga prisa! Por favor, tómese un poco más de tiempo para responder a la pregunta del modo más detallado posible.

Table A3.　　　Mexican version of the motivational statements

Category	Motivational Statement
Category 1	En este punto necesitamos su respuesta. Por favor, tómese un poco más de tiempo para responder a la pregunta de la manera más detallada posible.
Category 2 & 4	Nos gustaría saber en qué Ud. pensó al contestar a la pregunta inicial. Por favor, trate de contestar a la siguiente pregunta adicional:
Category 3	Por favor, tómese un momento de reflexión. Su respuesta es muy valiosa para este proyecto de investigación científica.
Category 5 & 6	Por favor, responda más detalladamente. Es importante para entender mejor su respuesta.
Category 7	¡No tenga prisa! Por favor, tómese un poco más de tiempo para responder a la pregunta de la manera más detallada posible.

Appendix C to get familiar with the question sequence and follow-up procedures that you could implement in your survey. Appendix C also includes screenshots of the specific configurations in EFS. When you have decided which type of follow-up procedure you would like to implement, follow these steps:

1. Look for the variable name of the open-ended question that you want to analyze. In the screenshot in Figure 6, this is `v_2400`.

2. Usually, you want the script to run when a respondent clicks the submit-button. To make this happen you need to call the function `evalprobeanswer()` on each page where you want the evaluation to happen. For this, go to the page properties and add the following JavaScript code to the submit button area: `evalprobeanswer();`
   This is shown in Figure 7.

3. In order to store the output of the tool and the results of the analysis, you need to add a user-defined question (question type 911) with several input fields. These input fields are the variables in which the result of the evaluation, any nonresponse code and further information will be saved. In addition, these data will be used in the filter expressions to decide whether the survey should follow-up with a nonresponse conversion attempt. It also gives you the wording of the suggested follow-up question text. You need to fit the variable names to the actual variable names in your own survey. The content variable is the variable name that you noted in step 1 (in Figure 6 and Figure 8, this is `v_2400`) so the tool knows where to look for the content that needs to be evaluated. See Figure 8 for details on how to configure the code.

4. Add a filter page and set the filter condition so that subsequent pages will be shown if the evaluation result is greater than zero. Figure 9 shows that, in this example, the filter condition should read "v_2401 is greater than zero". This means that only respondents that are identified as nonrespondents receive the questions that are within the filter (that is, the follow-up question with a motivational statement).

5. *Add a question page (relating to the filter) and an open-ended question which presents the follow-up question. The question text was stored in the variable name associated with p_ask in step 3. Therefore, you only need to add* `#v_2402#` *in the question text field (Figure 11). It is good practice to also repeat your previous question and you could do that in the field for the fill-in instructions. Should you decide to change the motivational statements you can edit the sentences in the code. Simply search for the motivational statements shown in Appendix B. This concludes the instructions on how to add the tool to any specific open-ended question.*

5.3   Settings that should be adjusted to the survey environment when using the tool

The tool has default settings but we advise you to adjust them to your specific needs. In particular:

1. You can specify the language that needs to be analyzed. If you do not specify any settings, the tool will assume that all answers are in English. In multi-language surveys, you would have to enter different question text for every language that you use. In EFS, for example, you can adjust the question text for each language. This means that you also can adjust the JavaScript code for each language which allows you to set the language version appropriately. You simply change the language to the correct number, for example `var selectedlanguage = lang_en` in English surveys. In case you want to use code which automatically detects the right language you might be able to implement the following approach: If the survey software tool that you use stores the language for a respondent in a variable, you can use this value to set the language of the tool. For example, in EFS the code that assigns the language variable to a JavaScript variable could be: `var selectedlanguage = {$language};` where the `{$language}` will be

replaced with the language numbers you have used in your language versions when programming the survey. This works within the template system of EFS. These language numbers need to match with the expected numbers of the tool (`var lang_de = 1; var lang_en = 2; var lang_us = 3; var lang_mx = 4; var lang_es = 5;`). In EFS, these numbers also correspond to the language numbers visible in the URL for the respondents.

2. You can specify whether you want to follow-up on single-word answers (default) or not.
3. You can specify whether you want tailored follow-up requests (default) or a general (one-fits-all) approach. A tailored follow-up request means that respondents receive different motivational statements depending on the type of nonresponse they provided in their initial response. A general request means that all respondents receive the same motivational statement independent of their initial response.

5.4 Additional features that can be adapted

In principle, you can also change other settings, such as the threshold length that determines a valid answer (i.e., long answers are never followed up, default is 50 characters) and what constitutes a too fast answer. A response time for an open-ended answer that is below 2000 milliseconds is by default always considered to be a nonresponse and will be followed up. We do not advise to change these settings as the default values have been tested with thousands of respondents in several international surveys. Nevertheless, you might use the tool in an environment in which you might want to tweak these settings to find the optimum for your needs.

6   Conclusion

Many open-ended questions in online surveys suffer from high nonresponse. Many respondents like to skip questions where they have to write answers themselves, and often researchers come across respondent answers that circumvent standard validity checks, such as "asdf" or "x". We developed the survey tool EvalAnswer specifically for use in the context of web probing (online probing) where respondents are asked several open-ended (follow-up) questions and are also requested to think more about their answers than usually required in surveys. EvalAnswers tackles various kinds of nonresponse and follows up with targeted motivational sentences in order to reduce nonresponse in a survey. This report offers a hands-on description of how EvalAnswer can be implemented in a survey, in particular in questback EFS. However, besides reducing nonresponse *during* a survey, EvalAnswers can be used in post-processing of answers to quickly sort out nonresponse in order to focus on substantive responses. In addition, in online panel research EvalAnswer may be used as a screener for potential panelists to ensure data quality in panel responses. Finally, this paper is firmly embedded in the context of open methodology; we strive to make transparent implementation and data-analytical procedures in order to increase transfer of knowledge and replication.

Literature

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Appendix A

Table B1.   Regular expressions used in EvalAnswer. This is the conceptual core for determining which answers are classified as nonresponse. Please use the code in the repository (see link on first page) as the following is difficult to read with respect to correct use of spaces and other formatting issues.

Subcategory	German regular expression	English regular expression	Spanish regular expression
Category 2 (No useful answer)			
two characters	^..?$	^..?$	^..?$
word without vowels	^[^aeiouüöä][^aeiouüöä][^aeiouüöä]+$	^[^aeiouyl][^aeiouy][^aeiouy]+$	^[^aeiouóúíáéñ][^aeiouóúíáéñ][^aeiouóúíáéñ]+$
Category 3 (Don't know)			
don´t know (variant 1)	^(ich)? *we*i?(ß|ss|s) *(ich)? *[a-zäöüß]* *[a-zäöüß]* *(nicht?|net)	^i know (little|nothing)	
don´t know (variant 2)	nicht we*i?(ß|ss|s)	^((be)?cause)? *i? *[a-z]* *do *n.?t *[a-z]* *k* *now*	^[a-zóúíáéñ]* *no *((lol?)? *s[ée].?.?.?$)|n[io] (lo)? *s(é|e|abr[ii]a) (como|ni |bien|que|porque)
DK/NK		^(I|i)*[nd]k.?$	
no reason	(kann|gibt) (es)? *keine [a-zäöüß]* *begründung		
not providing a reason	nicht begründen.?$		
never thought about	nicht beschäftigt	(not|never) *[a-z]* *i? (have)? *thought *about	
no preoccupation	keine beschäftigung		
what is meant	was ist *[a-zäöüß]*gemeint	^[a-z]* *not clear	
no opinion, experience, interest	^[a-zäöüß]* *(ich)? *keine?n? [a-zäöüß]* *(beispiel|meinung|ah?n?ung|interesse)	^i? *((have? ?n.?.? *(got)?)|(do *n.?t have)|no) *a?n? [a-z]* *(idea|opinions? *(on *th.?.? *(matter)?)?|interest|experience|facts).?$	^(por *que)? *(no)? *(tengo)? *(ni idea|me interesa *[a-zóúíáéñ]* *[a-zóúíáéñ]*).?$
no strong feelings		^i? *((have? ?n.?.? *(got)?)|(do *n.?t have)|no) strong feelings	
don´t understand question	verstehe? die frage nich	^i? *[a-z]* *do *n.?t *[a-z]* *i? *(under *stand|get)	queda(do)* [a-zzóúíáéñ]* *clar[oa] la pregunta
question not understandable	frage nicht? versteh		pregunta [a-zóúíáéñ]* *confusa
didn´t understand	nicht verstanden		no [a-z]* *(ent(i)?end|caigo)
don´t know what to do with it	nichts? *[a-zäöüß]* anz?u?fangen.?$		
not familiar with	nicht *geläufig	not *(to)? *familiar *with	
never heard	nie *gehört		
don´t know the term	kenne? den begriff nich		
nothing comes to my mind	fällt (mir)? *[a-zäöüß]* *[a-zäöüß]* nichts		no se me ocurre

Subcategory	German regular expression	English regular expression	Spanish regular expression
I can't (variant 1)	^kann? ich [a-zäöüß]* *nich	^((no)? *(i|just)? *cann?.?t.?$|(i|just|i? *really|because *i?)? *cann?.?t *(comment|think|say|explain|choose|make my mind up))	^no [a-zóúíáéñ]* *(pued(o|e.?$)|.?podr[ií]a|explicar)
difficult to	(schwer zu)	(hard|difficult) *to *[a-z]*.?$	
I can't (variant 2)	nicht [a-zäöüß]* *kann.?$		
not easy		^not an easy choice.?$	
not providing explanation	nicht erklären.?$		
not providing judgment	nicht beurteilen.?$		
not providing evaluation	nicht einschätzen.?$		
what means	was hei(ß|ss|s)t		
not sure		^(as)? *(i *.?m)? *((do *n.?t|not) *[a-z]* *.ure|^ns)	no [a-zóúíáéñ]* *segur[oa]
unsure		unsure	no (lo)? *tengo (muy|(una)?respuesta)? *clar[oa].?$
never thought about	(nie|nicht) *nachgedacht		
no idea	keine?n? *plan	^no idea	
not into		^i.?m not into	
Category 4 (Refusal)			
nothing	^an *(gar)? *(nix|nichts)	^(not?|no.e*|nothing) *(in particular|at all|really)*.?$	^(no *mucho)?|[a-zóúíáéñ]* *nada|nada *[a-zóúíáéñ]*|ningun[oa]).? *$
nothing to add		^nothing *to *add*.?$	^(no tengo)? *nada que (decir|añadir)
ok	ok(a[yji])?.?$	^(not|it.?s)? *(just)? *ok.?$	
same answer	(gleiche?s?|selbe) [a-zäöüß]* *wie	^same *[a-z]* *(as)? *[a-z]*.?$	(anterio?ro?(mente)? *[a-záéíóúñ]*|mismo [a-zóúíáéñ]* antes|^[a-zóúíáéñ]* *lo mismo).?$
see previous answer	^(s(\.|iehe)) *(vorh?e?r?igen?)?	(see|have) *[a-z]* *(answer|question).?$	
see above	^s\.o\.	^(as)? *(before|already) *[a-z]*.?$	
already explained	habe? ich [a-zäöüß]* *begründet		
just said		^i? *just *(said|wrote)	ya (lo)? *(he)? *dic(e|ho)
enough			^[a-zóúíáéñ]* *(detallado|suficiente).?$
clear			^[a-zóúíáéñ]* *[a-zóúíáéñ]* *clar[oa] *[a-zóúíáéñ]* *[a-zóúíáéñ]* *.?$
stupid question	(komische|blöde|dumme|sinnfreie) (frage|aussage)	(dumb|stupid|ridiculous) question	no [a-zóúíáéñ]* *sentido
self-explanatory	erklärt sich [a-zäöüß]* *von selbst	^it speaks for it *self.?$	^[a-zóúíáéñ]* *[a-zóúíáéñ]* *evidente.?.?.?$

Subcategory	German regular expression	English regular expression	Spanish regular expression
why should I provide a reason	^(was|wozu|das) *[a-zäöüß]* *begründe[nt]?		
no reason	^keine [a-zäöüß]* *begründung.?$	^no [a-z]* *reason	
no answer	^(habe?)? *(ich)? *(keine?n?|ohne) *[a-zäöüß]* *(angabe|aussage|kommentar|erklärung|antw)	^i? *((have? ?n.?.? *(got)?)|(do *n.?t have)|no) *a?n? [a-z]* *answer	^[a-zóúíáéñ]* *[a-zóúíáéñ]* *contest(e|é|o|ado|ar).?$
no comment	no comment	^((no comment(s)?)|i? *(d?[on]*.?t? *[a-z]* *(have)? *a? *comments?))	(non? comment|pruebas)
n/a	^(k\.? *a\.|k\. *a\.?).?$	^n.?(a|c).?$	(^nc|nc.?$\|^na.?$)
I do not want to (variant 1)	^m.chte [a-zäöüß]* *[a-zäöüß]* *nicht	^i? *[a-z]* *do *n.?t *want *(to).?$	
want to abstain	möchte mich *[a-zäöüß]* *[a-zäöüß]* *enthalten	^not prepared to [a-z]*.?$	
I do not want to (variant 2)	will ich nicht		
I won't say	sag ich nicht	^[a-z`´']* *not *(to)? (say(ing)?|disclose).?$	
Category 5 (Other nonresponse)			
why shouldn´t	^((warum|weshalb|es) *soll(te)* *[a-zäöüß]* *[a-zäöüß]* *nicht)		por *[qk](u*e)? no.?$
why should I	^(warum|weshalb|es|woher) *soll(te)? (ich|schon|dies)		
possible	^(es|ist) *[a-zäöüß]* *möglich.?$		
my opinion	(meiner?|persönliche|eben) *(meinung|ansichtssache) *[a-zäöüß]*.?$	^(because)? *[a-z]* *[a-z]* *(my|personal) *[a-z]* *(opi.ion|experience)	es lo que (pienso|creo|es).?$
subjective		matter of opinion.?$	subjetiv[oa].?$
feeling		(feels [a-z]*|way i feel).?$	
so-so	^teils *-? *teils.?$	^50.50.?$	en parte.?$
yes and no	^ja und nein		
neither nor	^weder noch.?$	^(neither|not|bit) *[a-z]* *(and)? *(n?o[rt]|bit) *[a-z]*.?$	
it depends	^(es)? *kommt da?rauf an.?.?.?$	^it depends.?$	
mixed feelings		^i? *(have)? *mixed feelings	
there is no reason	^(dafür|dazu|ich|weil) *[a-zäöüß]* *kein[en]* *(gr[üu]nde?|begründ[eungt] {2,3}|probleme?)		
it´s obvious	^das liegt *(doch)? auf der hand	of course.?$	(l[oó]gico|obvio).?$
because		^(because|cos) *[a-z]* *[a-z]*.?$	
just like that	^einfach so.?$	just do.?$	^porque es c[óo]mo es

Subcategory	German regular expression	English regular expression	Spanish regular expression
it is like that	^(es)? *ist* *[a-zäöüß]* *[a-zäöüß]* *so.?.?$	just like it.?$	^[a-záéíóúñ]* *(pienso que)? *es as[íi].?$
like that	(so (ist|war) *[a-zäöüß]*.?$)		^porq(ue)? s[i|í]* *[a-zóúíáéñ]*.?$
it should be like that	es so sein soll	how it should be.?$	
just the way it is	eben mal	((the way it is)|(jus. (is|did))).?$	
just how it is	nun mal so *(ist)?.?$	^just what it is.?$	as[íi] es.?$
that´s the way		^(it *.?s|that.?s)? the way.?$	
how I feel		how i feel.?$	^(por *que)? *(no)? *[a-záéíóúñ]* *(lo|me) siento *(algo|asi)?.?$
just am		^i? *just am.?$	
why not	^(wieso|weshalb|warum) *[a-zäöüß]* *[a-zäöüß]* *nicht? *.?.?.?$	why *not.?	
don´t think	^finde? *ich *[a-zäöüß]* (nicht)? *[a-zäöüß]* *[a-zäöüß]*.?$	^i? *(don.?t)? *think *so.?$	
(don´t) agree	stimme [a-zäöüß]* *[a-zäöüß]* *[a-zäöüß]* *zu	^(because)? *i? *(do *n.?t)? *agreed? *(with)? *[a-z]* *(statement)?.?$	^[a-záéíóúñ]* *[a-záéíóúñ]* *(de *|des)acuerdo.?$
very	^(sehr|zu) *[a-zäöüß]*.?$	^(not)? *very *[a-z]*.?$	
like			^[a-zóúíáéñ]* *[a-zóúíáéñ]* *me gusta.?$
important	^(ist|nicht) [a-zäöüß]* *[a-zäöüß]* *[a-zäöüß]* *wichtig.?$	^(it.?.?s)? *[a-z]* *important.?$	^(no)? *[a-záéíóúñ]* *[a-záéíóúñ]* *(importante|satisfech[oa]).?$
in between		i *.?m *[i|o]n *the *middle	entre *l[oa]s *dos
don´t care	^[a-zäöüß]* *(ist)? *[a-zäöüß]* *egal.?$	^i? *do *n.?t care	^[no|porque]* *me parec
indifferent		^((i.?.?m)? *indifferent|no *diff?e?rence.?$)	(^[a-záéíóúñ]* *[a-záéíóúñ]* *igual|neutral).?$
little			^[a-zóúíáéñ]* *poco.?$
quite/fairly		^(i..m|not)? *(about|quite|fairly) *[a-z]*.?$	^[a-zóúíáéñ]+ *[a-zóúíáéñ]* *orgulloso.?$
true	^(weil)? *[a-zäöüß]* *[a-zäöüß]* *stimmt.?$	^(because)? *(it.?.?s)? *true.?$	^[a-záéíóúñ]* *[a-záéíóúñ]* *correcto$
not true	stimmt nicht.?$		^no creo.?$
bored		^(i.?.?m)? *bored *[a-z]*.?$	
seems		^seems *[a-z]*.?$	
Code 6 (Single-word answer)			
Single-word answer	^[a-zäöüß]?[a-zäöüß]?[a-zäöüß]?[a-zäöüß]?[aeiouäöü][a-zäöüß]+.?$	^[a-z]?[a-z]?[a-z]?[a-z]?[aeiouy][a-z]+.?$	^[a-zóúíáéñ]?[a-zóúíáéñ]?[a-zóúíáéñ]?[a-zóúíáéñ]?[aeiouóúíáé][a-zóúíáéñ]+.? *$

Appendix B

German, Spanish, and Mexican version of the motivational statements

Table A1.   German version of the motivational statements

Category	*Motivational Statement*
Category 1	Wir benötigen hier Ihre Antwort. Bitte nehmen Sie sich ein wenig Zeit, um die Frage so ausführlich wie möglich zu beantworten.
Category 2 & 4	Wir würden gerne verstehen, was Sie bei der Frage gedacht haben. Bitte bemühen Sie sich, die folgende Nachfrage zu beantworten.
Category 3	Bitte denken Sie noch einmal nach. Ihre Antwort ist sehr wichtig für dieses Forschungsprojekt.
Category 5 & 6	Bitte antworten Sie etwas ausführlicher. Dies ist wichtig, um Ihre Antwort besser zu verstehen.
Category 7	Sie haben es aber eilig! Bitte nehmen Sie sich ein wenig mehr Zeit, um die Frage so ausführlich wie möglich zu beantworten.

Table A2.   Spanish version of the motivational statements

Category	*Motivational Statement*
Category 1	En este punto necesitamos su respuesta. Por favor, tómese un poco más de tiempo para responder a la pregunta del modo más detallado posible.
Category 2 & 4	Nos gustaría saber en qué Ud. ha pensado al contestar a la pregunta inicial. Por favor, trate de contestar a la siguiente pregunta adicional:
Category 3	Por favor, tómese un momento de reflexión. Su respuesta es muy valiosa para este proyecto de investigación científica.
Category 5 & 6	Por favor, responda más detalladamente. Es importante para entender mejor su respuesta.
Category 7	¡No tenga prisa! Por favor, tómese un poco más de tiempo para responder a la pregunta del modo más detallado posible.

Table A3.   Mexican version of the motivational statements

Category	*Motivational Statement*
Category 1	En este punto necesitamos su respuesta. Por favor, tómese un poco más de tiempo para responder a la pregunta de la manera más detallada posible.
Category 2 & 4	Nos gustaría saber en qué Ud. pensó al contestar a la pregunta inicial. Por favor, trate de contestar a la siguiente pregunta adicional:
Category 3	Por favor, tómese un momento de reflexión. Su respuesta es muy valiosa para este proyecto de investigación científica.
Category 5 & 6	Por favor, responda más detalladamente. Es importante para entender mejor su respuesta.
Category 7	¡No tenga prisa! Por favor, tómese un poco más de tiempo para responder a la pregunta de la manera más detallada posible.

Appendix C

Example of an open-ended question following a rating scale question

This example with screenshots from three online survey pages illustrates the sequence of a rating scale, followed by a category-selection probe (which is an open-ended question), which is then followed-up with a nonresponse conversion attempt (an additional open-ended question). The appendix also gives details on the specific configurations in EFS.

Figure 1:   Page structure in EFS for this example.

Page 1: Closed-ended question

Here you can see an example of a typical rating scale (the respondents view is shown in Figure 2; the configuration in EFS is shown in Figure 3). Let us assume that the respondent selects the answer value "partly good, partly poor" and clicks on the button "Continue."

Figure 2:   Rating scale question.

Question

⚙ View   ⓘ

Question text	↶ ↷ **B** *I* U S̶ A ▾ 🔗 ✂ 🖼 📋 *I*ₓ ‹› In general, how would you rate the current state of the economy in your country?
Fill-in instruction	↶ ↷ **B** *I* U S̶ A ▾ 🔗 ✂ 🖼 📋 *I*ₓ ‹›
Help text	↶ ↷ **B** *I* U S̶ A ▾ 🔗 ✂ 🖼 📋 *I*ₓ ‹›

Mark question as "protected"	☐
Hide question, if ...	↳ Define
Activate vertical flipping of answers	☐
Mandatory (DAC)	Yes (can be ignored) ▾
Alternate colors	☐
Dynamic column break after each x answer options	[ ]
Wrap item text	☑
External varname	ecs
Use question for language selection	☐

▸ **[Dynamic answers]**

[(No list selected yet)]

Answers

Paste from Word	Generate new codes	Sort alphabetically	Assign to list	Group overview

VARIABLE NAME	NO.		CODE	ANSWER OPTION	TYPE	INPUT FORMAT	MISSING VALUE	RANDOMI-ZATION	NEW COLUMN	DELETE	HIDING CONDITION
New ⊕						Answer option ▾ ⓘ					
							☑	☑	☑	☑	
v_1444	1	⬍	1	very good	A		☐	☐	☐	☐	↳
v_1444	2	⬍	2	good	A		☐	☐	☐	☐	↳
v_1444	3	⬍	3	partly good, partly poor	A		☐	☐	☐	☐	↳
v_1444	4	⬍	4	poor	A		☐	☐	☐	☐	↳
v_1444	5	⬍	5	very poor	A		☐	☐	☐	☐	↳
v_1444	6	⬍	98	_____	Tit			☐	☐	☐	↳
v_1444	7	⬍	97	<i>can't choose</i>	A		☑	☐	☐	☐	↳

Variable name we need in the probing question

Figure 3:   Configuration in the questionnaire editor in questback EFS for the rating scale question of Figure 2.

Page 2: Probing question

On the next page, the respondent is asked the category-selection probe (Figure 4).

Figure 4: Probing question.

The survey software does the following: It takes the label from the previously selected answer category and inserts it into the question text, in this case "partly good, partly poor." This page saves several hidden variables in addition to the answer (see Figure 6, Figure 7, and Figure 8 for the configuration in EFS):

- var p_probecode: The assigned nonresponse code as a result of evaluating the answer (a numeric value).
- var p_ask: A string containing the suggested wording for a follow-up question.
- p_keytime: Response latency information about using the keyboard.
- p_keystroke: the keystroke trail. That is, every character that the respondent has typed by using the keyboard.

The respondent enters his or her answer to the open-ended question and clicks "continue." (Figure 5).

Figure 5: Probing question and an answer by a respondent.

Figure 6:   EFS settings for the probing question.

Figure 7:   You want that the answer is evaluated when the continue-button is clicked. This screenshot shows the EFS settings of the page properties. Enter the JavaScript function call in the indicated section (do not forget the ";" at the end).

Figure 8:   911-question type relating to the probing question.

Page 3: Nonresponse conversion attempt (follow-up question)

This page is preceded by a filter which ensures that only nonrespondents get the motivational statement (Figure 9).

Figure 9:   Filter settings which make sure that only nonrespondents receive the nonresponse attempt.

The tool evaluated the answer of the respondent ("don't know" in Figure 5) and coded it into a "don't know" category. Therefore, the respondent receives a follow-up request to obtain a more detailed answer (Figure 10). In addition, the motivational statement is also adapted to a "don't know" response.

Here is what the survey software does: The content of the variable p_ask is inserted into the question area and the previous question is repeated (Figure 11 shows the configuration in EFS).

Figure 10: Nonresponse conversion attempt after the respondent provided a nonresponse to the initial open-ended question.

Figure 11: EFS settings for nonresponse conversion attempt.

Example illustrating a market research question

In contexts where you want to use open-ended questions as your main data source and not as a follow-up to a closed-ended item, you can also use the tool to evaluate the answers immediately. On the first page, you would ask your usual open-ended question and the software would evaluate the answer. The second page is then shown if a nonresponse conversion attempt is required.

Page 1: Open-ended question

Please describe your last shopping experience in which you bought perfume.
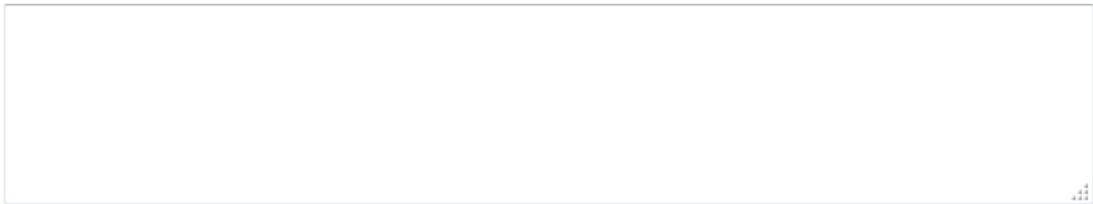
Figure 12:   Open-ended question example which could be used in market research.

Page 2: Nonresponse conversion attempt (follow-up question)

If the respondent's answer is insufficient, this page will be displayed with the most appropriate follow-up question.

Please consider the question again. Your answer is very important for this research project.

Please describe your last shopping experience in which you bought perfume.
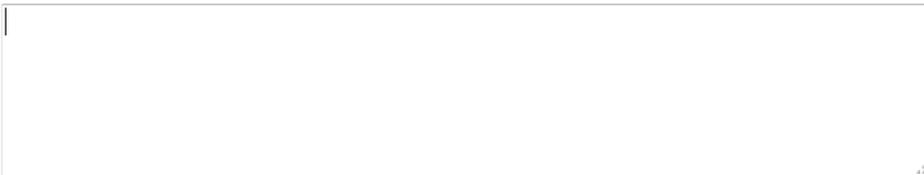
Figure 13:   Example for a follow-up nonresponse conversion attempt in market research after a respondent answered "don't know" to the previous question.