

**THE ART OF INTERPRETATION –
CHANCES AND RISKS ON INTERPRETATION
IN THE FIELD OF MOBILE TESTING**

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ABSTRACT

Carrying out a usability test is a demanding process per se. Mobile tests raise this claim because they are subject to real usage conditions and therefore unforeseeable factors. On the one hand there are the technical factors like tools, software and laboratory equipment, but on the other hand there are the human beings with their knowledge and decision-making. They are taking the selection of tools, methods and data, and they decide in every situation of the process of testing. Using a mobile eye-tracking test, the authors will explain where the sources for interpretation are and when misinterpretation become an error. Technology philosophical considerations on interpretation and hermeneutics have to support the recognition of the potential of interpretation. As a result, misinterpretation can be minimized.

KEY WORDS

Usability, mobile testing, errors, Philosophy of Technologie, interpretation, hermeneutics

INTRODUCTION

Everywhere an overload of information flows to us, which will be perceived consciously or unconsciously, selected and interpreted. Often the user of technical artifacts is overwhelmed because his expectations do not correspond to the designed objects or interaction systems. The testing under real conditions is the most important added value of a mobile usability study. Although tests performed outside of testing laboratories provide a less reliable appearing value in strictly scientific terms, they offer an enormous epistemical potential for all involved. Better understanding of the users, the contexts, the production processes and the dealing with these processes will generate possibilities for ethical technical actions. With a hermeneutical ethics, the potential for interpretation, varied contained in different layers of a mobile eyetracking study, will be done methodically reflectable. This will be considered in the following example.

INTERPRETATION AND HERMENEUTICS

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If we want to speak about *interpretation* and its risks and chances, at first let's look at the term: It is used at least in 4 senses:

1. a mental representation of the meaning or significance of something,
2. the act of interpreting something as expressed in an artistic performance,
3. an explanation that results from interpreting something and
4. an explanation of something that is not immediately obvious.³

The description of interpretation has some different approaches⁴, so a philosophical interpretation is an assignment of meanings to various concepts, symbols, or objects under consideration. It is to be seen that interpretation⁵ is very closed to signs, symbols and meaning, in this way closed to semiotics⁶ and semantics⁷ too, with Syntactics as Relations among signs (e.g. in formal structures) and pragmatics as the relation between signs (and sign-using agents). So interpretation is a complex theoretical construct, determined by numerous factors, in our case by technical (data, tools and interfaces) and human (action, communication, perception, senses). To understand or interact with something, we always have to interpret signs or symbols, e.g. as multimodal information.

So, how we can make this ubiquitous, essential but fragile construct interpretation more confident, more valid?

The recent *Philosophy of Technology*⁸ uses the (re-newed) methodology of hermeneutics. It was known as the theory and methodology of interpretation, especially of scriptural text⁹. The Hermeneutics is re-developed as an instrument for understanding and knowledge-creation (under current conditions like multidisciplinary, network; increasing use of information technology like the internet, globalization, etc.). In his book¹⁰ *Hermeneutische Ethik*¹¹ the philosopher Bernhard Irrgang described

„ihr (der hermeneutischen Ethik; note of the author) Ansatz gilt der Ermöglichung einer Reflexionskultur des Deutens und Wertens gemeinschaftlicher Praxen, die immer häufiger, mehr oder weniger eine technologische Struktur tragen. Der handelnde Mensch steht hierbei im Zentrum der ethischen Untersuchungen in seinem situativen Kontext, also in menschlicher Praxis.“ [5;introduction]

The *hermeneutic ethics* should take account three perspectives:

1. Expert Review with the ethos of neutrality

³ Based on WordNet 3.0, Farlex clipart collection. © 2003-2012 Princeton University, Farlex Inc. See also: The American Heritage® Dictionary of the English Language, Fourth Edition copyright ©2000 by Houghton Mifflin Company. Updated in 2009. Published by Houghton Mifflin Company. internet resource: <http://www.thefreedictionary.com/interpretation>; 10.3.2014

⁴ In Logic I. is an assignment of meaning to the symbols of a formal language. Even in Math, science and computing we use the word Interpretation (model theory) as a technical notion that approximates the idea of representing a logical structure inside another structure and the Interpreter is a program (a virtual processor) that is able to execute instructions written in a high-level programming language, s.a /q.v. Hodges, Wilfrid (1997), A shorter model theory, Cambridge: Cambridge University Press, ISBN 978-0-521-58713-6

⁵ In: De Interpretatione, Aristotle (384-322 BC) offers a theory which lays the groundwork for many later theories of interpretation and also for semiotics.

⁶ The study of signs and symbols and their use or interpretation

⁷ The study of meaning-making, come up from Ancient Greek: σημαντικός sēmantikós; It focuses on the relation between signifiers, like words, phrases and symbols, and what they stand for, their denotata or meaning

⁸ A classic: Hubig, Ch.; Huning, Alois; Ropohl, Günter: Nachdenken über Technik. Sigma 2000.

⁹ For instance as exegese of Bible.

¹⁰ Irrgang, Bernhard: Hermeneutische Ethik, Darmstadt 2007 (IRR2007).

¹¹ Ethics are about the practical means of determining a moral course of action.

2. reflection of the subjective settings options for the risk
3. Technology-culture of reflection (discussion between laymen and experts)

This requires skills of all process participants ahead, eg for a professionalized discourse, as well as criteria and methodological procedures. (5;223) The goal is pragmatic consistency of interpretation and argumentation [5;introduction]. For Irrgang hermeneutics is a technique of better understanding the assessed practice. For this purpose, ethics especially in conflict situations (including as a result of problems of interpretation) have to take place different perspectives to mediation, therefore an absolute point of view is not possible. (5;11).

Instead of rigid ethical corsets, Irrgang proposes ethical evaluation as a function of thought experiments a correction open research-ethics of searching and finding (Zetetische Ethik).

It is based on the search for heuristics and horizons of interpretation and „sees itself as a guide to looking closely“ (5;16). Paradigms are proclaimed, not policy. (5;14) He described hermeneutical ethics as the art of reflection, to reach the good by practice. Central paradigms are:

1. a functional dimension (perspective of success, effectiveness)
2. a benefit-oriented dimension (perspective of the usable and the useful)
3. refers to a moral dimension (perspective of the ethical and the visionary) (5;18)

Hermeneutical Ethics as art of interpretation are intended as a guideline to successful and good practice, in which the pragmatic interpretation of the instructions is connected „Both - as well as“ e.g. a „minimal ethics“ (non-injury) with a „model of ethics“ (by accountability, self-realization, while avoiding the harm to others, both staff, nationally and internationally, combined with the basic idea of „To help people to help themselves“, the facilitation of pluralism, as well as liberating, not paternalistic caring action for other) (5;30).

POTENTIALS FOR INTERPRETATION DURING A MOBILE TEST

As decisions, that significantly influence the test scenario, already made in the preparation phase of a mobile test. At this point the first influencing factors have to be identified and assessed. The choice of research methods is certainly one of the most sweeping decision, which sets the whole course of the test. In the case considered here, the testers chose a mobile eyetracker as the measuring tool. The selection of the eyetracker allows alternatives that must be systematically thought through and matched with the existing capacity. Compromise at this point can possibly lead to inaccuracies in the data collection later in the course of the test. An important precondition for the selection of a useful measurement tool is a correct assessment of the test situation. An eyetracking test in the retail sector, at a time of expiration of the normal daily business in a sales facility limits the selection of potential tools. For the study considered here, the device *Tobii Glasses* (Figure 1) was used, which is characterized by low weight and compact size and relative inconspicuousness in the use.



Fig. 1 Utilized measuring instrument - Tobii Glasses

It is the experience of the test conductors, which may lead to different views in the assessment of the test situation, and finally lead to a selection of a right or wrong tool.

In practice, a selection is often not possible, and the tester simply use an already existing device. Karin Knorr Cetina, one of the pioneers in the field of science and technology studies, specifically dedicated to the constitution of knowledge under laboratory conditions. She talks about local and situation-specific circumstances of the research. These are implicit, practical skills of the actors, complex selection processes and specific decisions that are embedded in local social relations field and context-bound. She emphasizes the variability of research decisions that depend on, among other things, what (including materials and technology) is available in each individual laboratory, whether it is sufficiently available or even if it works or it is broken, as well as whether and how well as someone is familiar with it. There are also local (e.g. national) particularities and collective resources include interpretations and agreements about what, why it is relevant. The characteristics of the technical equipment must be widely known in each case. This is the only way how the pros and cons can be estimated.

The use of a specific measurement technique is influencing the course of the test. So a calibration of the eyetracker is to perform before each new test. Unfavorable lighting conditions may complicate this process. Even if the measurement technique over a symbolism identifies a calibration procedure as successful, the test personnel must interpret these symbols and decide whether a test can be performed. Often it only can be decided by observing the whole calibration process, whether the quality of the calibration (Figure 2) is sufficient for a test. An inaccurate calibration is a source for misperceptions in the data evaluation.



Fig. 2 Result of the calibration (output of the eyetracker)

Mostly the calibration of the eye tracker is just one technical module during an eye tracking session. For a subsequent efficient data analysis IR marker¹² may be used. This peripheral technique only can provide an added value however it is installed correctly, otherwise an additional source of misinterpretation will be generated.

The mobile eye tracker is calibrated to a distance of one meter to the object being viewed. The image section the eye recognizes is accurate with the image that is displayed by the technique only in this area. However, the test person can move freely during the test and considers certain objects in the distance or in close range. In these areas the so-called parallax error occurs, which needs to be corrected later. This is particularly important when viewed objects are placed very close together, as in the case of a retail rack. A review of the recording material and an assessment of whether the particular test person is in close or long range to the object under consideration is required. An incorrect estimate of the distance is a direct result in incorrect statements if the test subject saw a given object or not.

The recording material available for data analysis can already be faulty because of transmitting misjudgments in preparation, test execution and data postprocessing. However, the data analysis can deliver false statements because of misinterpretation of certain measurements. The selection of the measuring tool was an important consideration when preparing an eye-tracking study, the choice of an evaluation mechanism is similarly important for the data evaluation. *GazePlot*¹³ and *Heatmap*¹⁴ are two forms of visualization based on exactly the same values.

While the *GazePlot* provides meaningful representations for individual recordings, a Heatmap plays its strengths in summarizing several shots. Because of choosing thresholds for certain information representations by software, this option for data analysis only provides limited objective statements.

Even a complete falsification of the real results can not be excluded in both ignorance as well as knowing the effect of different parameter settings.

For data evaluation *Areas of Interest*¹⁵ (AOI) also can be used. Static AOI leads to a result very quickly, but the values, however - especially in mobile studies - have to be considered critical. This is related to the fact that a sales area does not satisfy the requirements, in terms of data collection, optimal test environment.

In this context the reliability of data can be ensured only if the interpretation potentials in preparation and execution are minimized. Practically this is done by a well prepared test scenario with adequately reliable experimental technique. Dynamic AOI can be used in the data analysis as well. The creation of dynamic AOI is a very time-consuming process, however this process is less sensitive to inaccuracies in the preparation and implementation than working with static AOI.

Although reliable experimental technique is absolutely necessary - that means optimal calibration of the eye tracker must be guaranteed - but in this process the peripheral equipment left out.

¹² IR markers (infrared markers) are placed in the test environment. During the test the markers are sending an identification number to the eyetracker. This additional information is inserted into the recording material.

¹³ A GazePlot provides eye movements as a chronological sequence of fixation points and saccades. This results in fixation points if something is considered by the test subjects as long as information recognition can take place, saccades, however, reveal rapid changes of the view that no information recognition occurs.

¹⁴ A Heatmap indicates areas, that are considered long or often.

¹⁵ An Area of Interest (AOI) is a viewing area that is featured in the evaluation, eg to make certain time measurements. We distinguish static and dynamic AOI. Static AOI can be created on a single image, dynamic AOI are generated in the recording video using keyframes.

CONCLUSION

Tests are determined by experiences and explicit and implicit knowledge of both: experts and users. We would therefore recommend the combination of usability methods and a (new) Ethical Hermeneutics to support the process of understanding the real user-contexts and -needs. This could be very helpful to reduce misinterpretation. So interpretation can become a powerful tool for knowledge and understanding to improve products, systems or acts.

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