How you look at art
Analyzing beholder’s movement pattern by radio-based identification

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Motivation
The research of aesthetic phenomena is a topic of growing interest. Nevertheless, research in real world scenarios (e.g. art museums) is sparse, although there are some studies about how people behave in art museums. Most of these studies analyze what the visitor does during his stay in the museum. Our goal is to go one step further and to facilitate and analyze reception of art – especially of modern art – as a process. What factors do play a role in this process and how important are they? What effects do paintings of different categories have on visitors?

Our hypothesis: Paintings differ from each other in certain characteristics (liking, ambiguity, effective value, complicatedness, graphiness, interestingness, uniqueness). These characteristics moderate the impact of paintings on the visitors. The result is a difference in the behavior of the visitors (speculation time per painting and viewing distance).

In addition, we were looking for a technical solution to avoid typical errors usually occurring when the behavior of exhibition visitors is recorded by human observers. In our view, only a cost-effective and, at the same time, reliable technology allows psychologists to track the behavior of spectators in a real-world setting across a whole exhibition; with justifiable effort, and without influencing (and disturbing) art experience.

We employed a commercial-off-the-shelf radio-frequency identification (RFID) technology and tested both, hypothesis and technology, in a carefully arranged mock exhibition with artworks selected after two pre-studies.

Method
Pre-studies. In a first pre-study the six most distinct paintings (out of nine proposed by us) for the main study were selected by a sample of students of psychology (n=31). The second pre-study (again with students of psychology, n=31) was a test of our main study’s questionnaire. Three main categories which differ in the characteristics mentioned above were derived and tested for discriminatory power.

Exhibition and paintings. A one-room art exhibition was arranged in the faculty building of psychology at Bamberg University. The room (9 x 16 m, ceiling height 3.50 m) was endowed with six large-sized (about 1x1 m) modern-art paintings (high-quality prints on canvas) distributed along the walls.

RFID technique. We installed 19 RFID beacons (manufacturer: metraTec, see metraTec, 2011) by mounting them in acrylic globes; globes were hanged with nylon cord 220 cm above floor level. Optimal sensor placement was evaluated using the YAMAMOTO software (see Figure 2; Stahl, 2008). For each artwork we defined one RFID cell for close, medium and far speculation distance. The spectators carried a mobile RFID receiver that logged the nearest RFID beacon once per second (hardware is shown in Figure 4).

Motivation
RFID tracking system is unobtrusive, cheap and yet, this is comparable to classic observation, and our mock exhibition, a further study – in a real museum – will have to try our findings.

The RFID system turned out to be a valuable means for a behavioral analysis of spectators’ movements. Spatial resolution limited us to three cells per artwork; yet, this is comparable to classic observation, and our RFID tracking system is unobtrusive, cheap and scalable. A follow-up study in a real museum, covering over ten exhibition rooms, has just been conducted; another one is bound to follow soon.

RFID System
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Results
Artworks of categories A (realistic) & B (creative) were rated higher (ps<.001) on the scales ambiguity and liking than paintings of category C (minimalistic). As different categories were tested for differences in viewing time (with regard to range). Artworks of category A were looked at longest, those of category C shortest (ps<.001). There was no significant influence of effective value. Overall ratings of liking and ambiguity were found as factors for the recipient’s behavior. Ambiguity rating is a predictor for the viewing times of category B (p=.006; β=.45) and C (p=.035; β=.30) artworks. For category A, liking is a predictor for staying time at close range (p=.018, β=.39). For category C, a correlation between liking and close-up viewing time was found (r=.21, p=.05).

Discussion
Using RFID technique, we found strong evidence in favor of our hypothesis. Category (and thus, content), had a significant influence on viewing times, and of three aesthetic concepts tested so far, two showed to have a behavioral relevance. Yet, as we had set up a mock exhibition, a further study – in a real museum – will have to try our findings.

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References

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Fig. 4. RFID beacon (on housing) and mobile receiver. Pen added for size comparison.