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Measuring immediate behavioral responses to the environment

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Even an observer who is not familiar with the subtle methodologies of science will notice that environmental factors of a location have quite an influence on our well-being. Without statistically significant data he will easily find that a walk in a botanical garden on a sunny afternoon is relaxing while the same amount of time on an equally sunny afternoon spent in a traffic jam might not have the same effect on mental health. The observer might conclude that plants have an overall relaxing effect, whereas cars are stressors. But as Goethe's Dr. Faustus discovered some hundred years ago: such simple statements do not satisfy the scientists restless mind (Goethe, 1808). We want to measure, categorize and explain. Above all we crave for data.
However, obtaining data for a manifold and versatile phenomenon as human behavior can be a difficult task at best. In the following we will present a study on hydrophilia introducing a video-based and software supported tool to gain observational data.
For the study on hydrophilia we hypothesized that in the evolution of man water was a resource as such and an indicator for other essential resources. An environment which features visible water should therefore be preferred to an environment where water is not visible (Ulrich, 1983; Herzog, 1985). In addition a positive emotional response should be elicited by water (Relph, 1976; Tuan, 1974; Orians & Heerwagen, 1992; Pitt, 1989). When we think of the processes involved in the human response to environment various approaches to verify this thesis are conceivable. Rather than analyze the perception of the environment before the actual response or conduct interviews to record the rational reflection of the experience we chose to observe human behavior on site. The advantages of this approach are that observation records data for the exact time and place the response to the environment happens and that it can be performed without the subjects awareness. But as we were to measure the behavioral response to environment the location for the experiment was crucial for the outcome of the study. For the relevance of the results we wanted to conduct the study in an everyday environment. Additionally all environmental (temperature, humidity etc.) factors except the factor in question (water) should be constant. To rule out individual factors the number of subjects has to be high and the subjects should not be familiar with the location so they would not notice any manipulation in the experimental setting. Taking all the requirements into account a shopping mall seemed to be ideal. We installed a fountain in a corridor of a shopping mall and filmed the scene with a hidden camera. After several recording sessions we changed the setting by emptying the fountain and filming the scene without water. In the course of three months we collected ten hours of video tape for the setting without water, and twenty hours with water. We developed a video processing software which reported the exact position of all passers-by five times per second and reconstructed their way through the area under study. In addition the behavioral response was monitored on a TV-screen. The duration of stay and control variables (age, gender etc.) of every 30^{th} subject and all cases of explorative and interactive behavior were documented. We found that if the fountain is filled with water passers-by duration of stay on the 52m2 area in question increases by 21.4 % ($p<0,05$; Mann Whitney U-Test, N=1029) and they prefer to stay meters closer to the fountain. The mean minimal distance to the fountain decreases by 0.17 meters (Mann-Whitney U-Test; 2 tailed $p = 0.000$, N=23450). They also were more likely to explore their environment (increase: 69%; $p<0,001$; Pearson Chi-Square, N=30230) and to interact with each other (increase: 109 %; $p<0,001$; Pearson Chi-Square, N=30230). All these behavioral items indicate increased well-being and a positive response to water as an element of interior design (Grahn, 1996; Kuo, Bacaicoa, Sullivan, 1998. Weisfeld & Wendorf 2000). The fact that the findings of both the digital video processing and the observation are consistent and that digital video processing allows to gain data in quantities and exactness that were not possible with conventional methods it proved to be a powerful tool to understand basic mechanisms of human behavior.

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