

Attributions in HCI: A Gendered View

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ABSTRACT

In two pilot studies we measured computer-related *attribution styles*, i.e. the systematic ascription of causes to effects in situations of failure or success, identifying a typology of nine specific attribution styles [6]. In this paper we briefly summarize results and take a specific look at gender differences regarding attribution patterns in situations of failure and success when using computers.

Author Keywords

Attribution, computer-related attitudes, computer mastery, computer failure, user typology

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI):
Miscellaneous.

INTRODUCTION AND BACKGROUND

Attribution research deals with the explanations people find for *why* things happened the way they did and the extent of *control* that people feel they have over external events. Attributions have long been known as having an important impact on people's behavior, emotions, and motivation [e.g. 5, 8]: Unfavorable attribution patterns might have detrimental effects on motivation, coping, and accomplishments or even go along with psychiatric illness. E.g., patients with depression often feel that they have no control over events in their lives, but nevertheless feel they deserve the blame for all negative things happening to them, while positive situations are attributed to simple luck [e.g. 2, 13]. This attribution style results in a vicious circle also known as "learned helplessness" [13].

In our research we investigate the impact of attributions on Human-Computer Interaction [6]. It seems feasible, for example, that the amount of control that users perceive to have over computer systems will influence their user experience and behavior. Likewise, users with different attribution styles might have quite different explanations for

events like system failures (blaming either the system or themselves), triggering different user responses. Therefore, knowledge of computer-related attributions might help to understand user behavior or identify design principles to support different types of users in a specific way.

So far, however, attribution processes have received little attention in HCI research. Interestingly, the few related studies are mainly concerned with gender differences. Several authors found that girls tend to explain successful computer use with external factors (simple tasks, being lucky) while blaming failures on their lack of competencies. Contrary, boys tend to attribute success to their own skills and failures to external circumstances (e.g. bad usability) [e.g. 3, 9, 12]. Male attribution styles correlate positively with media competencies and computer skills [7].

In the next section we briefly summarize the results of two pilot studies on computer-related attribution styles, resulting in a first typology, which was published in [6]. In this paper, we re-analyzed our data with a focus on *gender differences* regarding attribution styles and discussed research questions and perspectives related to attributions and gender.

ATTRIBUTION STYLES: A TYPOLOGY

In two pilot studies, we investigated whether stable attribution styles could be identified regarding computer-related behaviors [6]. The first study was a diary study [cf. 10] with users who documented real situations of computer use over a time period of several weeks, using a paper diary consisting of short standardized questionnaires measuring attributions in situations of computer-related successes and failures. Participants were high school and college students as well as employees of the University of Hamburg and were mostly personally invited. N=19 persons returned their diaries to us, reporting a total of 152 situations to analyze. 11 participants were female (58%). Mean age was 25.4 years (range: 17-58 years).

In a second study, we used an online questionnaire based on the FECA questionnaire developed by [4], which described situations of computer use (see table 1) and asked participants about the attributions these situations evoked [6]. Invitations for this study were extended to members and students of the University of Hamburg and additionally via mailing lists and social networks to get a less specific sample of users in relation to computer usage. 96 persons

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participated in the survey. 33 questionnaires were incomplete and thus excluded from the study, resulting in a final N=63. 37 participants were female (58.7%). Mean age was 29.6 years (range: 20-61 years).

Both studies differentiated between situations of success and failure, as is usually done in attribution research. Furthermore, the diary as well as the questionnaire were based on the four dimensions that have been identified in general attribution research, namely *locus*, *stability*, *controllability*, and *globality* [e.g. 2, 13]:

- *Locus* describes whether a person sees internal or external causes of an event (e.g. blaming oneself vs. external factors).
- *Stability* refers to the temporal aspect (“this time” vs. “always”).
- *Controllability* describes the influence a person believes to have on the situation.
- Finally, *globality* refers to the generalizability of the cause.

In both studies, data was analyzed by means of *Cluster Analysis*, a statistical method to discover recurring patterns and structures in data [1]. A detailed description of the procedure is given in [6]. The reported attributional values for each participant and situation were averaged over the four dimensions. After that similar participants were grouped together while controlling the increase of intragroup variability, using Ward’s method. The final cluster solutions were chosen for their high interpretability and low intragroup variance.

Results of both studies indicate that indeed people display stable, specific computer-related attribution styles. Both studies showed very similar results even though using different methods for data collection. A total of nine attribution styles were identified. Six of them were identical in both studies [6]. The slight differences are probably due to differences in sample characteristics and also the small sample sizes. In the following sections, we briefly describe the distinct attribution styles using stereotypical names and exemplary statements to illustrate the kind of attitude and behavior that might be associated with the respective style.

Regarding the attribution of computer-related *success*, the following five styles were identified [6]:

- *“Realistic”* – *“Sometimes I am successful, sometimes not”*. Persons with this style have medium values in all dimensions except for stability, where they have the lowest values, which can be interpreted as a realistic, but not overly optimistic view of their own achievements.
- *“Humble”* – *“This time I was lucky”*. Persons with this style attribute success to external factors and experience only low levels of control when using computers.

| | |
|--------------------|--|
| Success situations | You are trying to use an unknown software function you never used before while laying out a presentation on your computer. It works instantly. |
| | You figured out by yourself how to use a new computer application. |
| | You quickly manage to use a formerly unknown user interface on another person’s computer. |
| | You would like to print some labels. By following the step-by-step instructions you are able to print the labels without any problems. |
| | You are conducting a literature search in your library. Even though the software is totally new to you, you learn to use it quickly. |
| Failure situations | After having had problems with your mail application for some time, it’s now working normally again. |
| | You accidentally delete a page when writing a paper on your computer. Despite many efforts you are not able to restore this page. |
| | A file that you saved on an external storage device can’t be opened any more. |
| | Your computer screen freezes while you are working on an important task. You try to solve the problem but a first attempt fails. |
| | A friend showed you an unusual but helpful software function. Later, when you’re trying to use that function by yourself, it doesn’t work. |
| | You are trying to print a handout for a presentation. The printer doesn’t respond. You are not able to solve the problem. |
| | You are waiting to receive an important e-mail. However, even though trying several times, you can’t access your mailbox. |

Table 1. Questionnaire Items [6].

- *“Lucky guy”* – *“Everything I do turns out right”*. Persons with this pattern feel more in control and also attribute more stable over time and also more globally, thus displaying a sense of faith that things will go right. [This style was identified only in the diary study.]
- *“Confident”* – *“I am competent and responsible for my own success”*. Persons with this pattern see internal reasons for success and experience high controllability. This can be seen as a favorable attribution style.
- *“The Boss”* – *“Success depends on the system, but I control it”*. Even though persons with this style tend to attribute success to external factors, they still feel in control of the situation and also have the highest values of stability and globality. This can be interpreted as a ‘boss-like’ attitude knowing that there may be external factors for success but believing that they exert control over them. [This style was identified only in the survey study.]

Regarding the attribution of computer-related failures, the following styles were identified [6]:

- “Realistic” – “This time I failed, but don’t worry about it”. Persons with this style see internal as well as external reasons for failures and believe they change over time and depend on the specific situation, but still feel rather in control. [This style was identified only in the survey study.]
- “Shrugging” – “Every failure is unique”. Those persons display medium values regarding locus, stability, and controllability, and low levels of globality, thus believing that different situations have unique causes.
- “Confident” – “I know it was my fault, but next time I will do better”. Persons with this pattern mainly see internal reasons for their failures, but experience high levels of controllability and also believe that failures will not persist over time or in different situations, thus displaying confidence that they will be successful in the future.
- “Resigned” – “I never understand what computers do”. These persons show a fatalistic attribution pattern: They perceive computer-related failures as uncontrollable and expect this to happen over and over again – a rather unfavorable attribution style that can be compared to the so-called pattern of “learned helplessness” that is observed in patients suffering from depression [cf. 1].

Gender Differences in Attribution Styles

According to the existing literature we expected women to show less favorable attribution styles compared to men. To investigate this hypothesis, we analyzed our empirical data with respect to gender differences. As the number of participants in the diary study was too low to investigate subgroups, we report here on the results of the questionnaire study.

On average participants had 15 years (range: 5-28 years) of experience in computer use. On average, participants self-rated their computer skills at 3.7 on a Likert scale ranging from 1 (low) to 5 (expert). As in prior studies, female participants had significantly less experience than men in computer use (12.6 years vs. 17.2 years, $p < 0.01$). Furthermore, women scored significantly lower than men in their self-ratings of computer skills (3.4 vs. 4.2, $p < 0.001$). T-tests were computed to measure gender differences. Table 2 illustrates the striking differences: While women mostly gave themselves medium values, the highest value 5 (“expert”) was the category chosen most often by men. Table 2 shows the number of men and women choosing the respective categories (from 1 = low to 5 = expert).

| category | 1 | 2 | 3 | 4 | 5 |
|----------|---|---|----|----|----|
| Female | 0 | 4 | 17 | 13 | 2 |
| Male | 0 | 1 | 5 | 9 | 11 |

Table 2. Self-ratings of men and women regarding computer skills.

Tables 3 and 4 show men’s and women’s attribution styles regarding failure and success situations. There are some notable differences regarding the occurrence of certain styles, which will be discussed in the next section. However, χ^2 tests showed no significant differences.

| % | Realistic | Humble | Confident | The Boss |
|---|-----------|--------|-----------|----------|
| w | 53.3 | 10.0 | 26.7 | 10.0 |
| m | 18.1 | 36.4 | 31.8 | 13.6 |

Note: The Lucky Guy style is missing in this table because this style was identified only in the diary study.

Table 3. Gender differences in attribution styles for success situations.

| % | Realistic | Shrugging | Confident | Resigned |
|---|-----------|-----------|-----------|----------|
| w | 17.6 | 41.2 | 26.5 | 14.7 |
| m | 26.1 | 21.7 | 8.7 | 43.5 |

Table 4. Gender differences in attribution styles for failure situations.

CONCLUSION AND FUTURE WORK

In this short paper we briefly summarized the result of two pilot studies on computer-related attribution styles. Detailed results regarding the attribution typology can be found in [6]. In this paper, we focused specifically on gender issues.

Drawing on prior research on gender differences [e.g. 3, 9, 12] we expected to find differences between men and women regarding their attribution styles. Indeed, as has been established by former research, women had significantly less experiences in computer usage and also displayed significantly less confidence in their own computer skills. Likewise, we identified several notable differences between men and women regarding their attribution styles, albeit not statistically significant. However, some differences were not quite as expected: In prior studies, girls/women mostly experienced lower levels of controllability regarding the use of computers. Typically, girls/women blamed themselves when something went wrong during computer use, while successes were rather attributed to chance and luck. On the contrary, boys/men blamed failures on technological shortcomings like software bugs or bad usability, while success was attributed to their own competencies and skills. Therefore, prior research assumed women to have generally more unfavorable attribution styles [3, 7, 9, 12].

Our study, however, shows a more differentiated picture. Women attributed success mostly in the “realistic” style (53.3%), which indicates a not overly optimistic, but also not outright negative attitude. The more favorable “confident” attribution style was shown more often by men, as one would have expected. However, the difference was not big: 31.8% of men attributed in this style, compared to 26.7% of women. Quite surprisingly, the “humble” style – attributing success to external factors and experiencing only low levels of control when using computers – was shown

much more often by men (36.4% compared to 10.0%). According to prior research, one might have expected that more women would display this rather unfavorable style.

Regarding the attribution of failures, a similarly surprising picture emerged: Women attributed much more often in the more favorable “confident” (26.5% vs. 8.7%) or “shrugging” styles (41.2% vs. 21.7%), while the unfavorable “resigned” style was shown predominantly by men (43.5% vs. 14.7%).

It is difficult to judge why our study contradicts prior findings on gender differences. One explanation might be that taking a closer look at attribution processes as we did in our study reveals more detailed results regarding gender differences compared to prior studies [e.g. 7, 9, 12]. However, we need to be careful in our interpretations due to a number of limitations of our study. For one thing, the number of participants was relatively low, and there was a bias as the sample consisted mainly of University students and staff. Furthermore, in the questionnaire study we did not measure real experiences but had the participants imagine certain situations that evoked computer-related attributions. Unfortunately, the low number of women participating in the diary study did not allow for gender-related analyses. Even though the two studies yielded quite similar results regarding the existence of general attribution styles, men and women might still show different attribution patterns in real vs. imagined situations.

Furthermore, in our study only biological gender differences were assessed. While this was also the case in prior studies [e.g. 7, 9, 12], in future research a more differentiated approach needs to be adopted, measuring gender as *socially constructed* [cf. 11].

The same is true for socioeconomic status, ethnical background and other personal characteristics. We did not collect detailed socio-demographic data because the aim of these pilot studies was to generate first insights regarding computer-related attribution styles. Now that this has been established as a promising approach, the relations between attribution styles and other variables need to be explored in depth. This includes the design of the artefacts in use, personal characteristics as well as the circumstances of use.

We are planning to account for these variables in future research. Furthermore, it will be interesting to investigate whether attribution styles lead to different actions in men or women, which might explain differences in computer-related behavior. Also, attribution styles might have different – positive or negative – effects, depending on users’ personal characteristics and experiences as well as the specific use situation.

We are currently conducting a study to measure attributions in usability tests in order to directly relate attribution styles

with user behavior. Furthermore we are planning to conduct another diary study with a larger sample to measure attributions in everyday situations and relate them to their social context.

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