

Under the Spell of Deadlines

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Figure 1: Four face illustrations conveying the plight of researchers as they negotiate paper and proposal deadlines. The facial expressions and postures were taken from actual observational data. The individual characteristics were altered to preserve anonymity.

ABSTRACT

Deadlines are constitutional aspects of research life that the CHI community frequently observes. Despite their importance, deadlines are understudied. Here we bring a mixed art and science perspective on deadlines, which may find broader applications as a starter methodology. In a field study, we monitored four academics at the office, two days before a deadline and two regular days, after the deadline had passed. Based on face video, questionnaire, and interview data we constructed their profiles. We added a dose of fictionalization to these profiles, composing anonymized comic stories that are as humorous as they are enlightening. In the stressful and lonely days towards deadlines, the only common presence in all cases is the researchers' computer. Accordingly, this work aspires to prompt an effort for a deeper understanding of "deadline users", in support of designing much needed affective interfaces.

CCS CONCEPTS

• **Human-centered computing** → **Human computer interaction (HCI); Empirical studies in HCI.**

KEYWORDS

User studies, facial expressions, emotions, human-computer interaction, deadlines, affective interfaces

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INTRODUCTION

In the human-computer interaction (HCI) community, the CHI deadline each fall is always in the back of researchers' minds, serving often as the culmination point of their year-long efforts. Similar considerations apply to the computer vision, artificial intelligence (AI), and other science, technology, engineering, and medicine (STEM) communities. Add to paper deadlines, deadlines associated with the submission of funding proposals, and a profile of deadline-driven lives emerges for academic and other researchers.

By nature, deadlines are critical and stressful events, where computers play an indispensable role. Deadlines require marshalling of psychological and physiological resources, and they redirect participants' attention and efforts away from other preoccupations [4]. Are these stressful and workfull jolts a blessing or a curse for the research profession? Do deadlines make researchers more productive? or, do deadlines merely harm researchers' health? The truth is probably somewhere in between and may partly depend on individual circumstances. As deadlines are understudied, however, there are no definitive answers to these questions, and thus no solid basis to develop solutions, especially solutions centered on the reformation of the computer role.

In fact, given the time critical and stressful state of affairs when researchers negotiate deadlines, few of the existing human-computer interfaces appear to be accommodating. For example, submission systems are often complex, inviting errors, especially from people under stress. Document preparation systems lack affective sensing, which in combination with AI tools could turn them into compassionate partners of anxious academics. Email clients eat away at

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valuable time resources as they cannot prioritize communication relevant to upcoming deadlines over other messages. Designers can work effectively on these and other concepts, only if they have more information about the deadline behaviors of users. Such information can be elicited through a series of badly needed studies.

To direct attention to the important issue of deadlines, stir discussion, and prompt further research, we present results from a small field study. The presentation is unique, as it combines science with art.

STUDY DESIGN

Per an institutionally approved protocol, we monitored four academic researchers (2 male/2 females) two days leading to a paper or proposal deadline, and two days after the deadline had passed. Monitoring was effected through a facial web camera and a ceiling web camera; the latter - termed operational theater (OT) camera - was pointed straight down at the participants' workspace. The two cameras were recording while the participants were working on their computers.

The participants also underwent an interview and completed certain questionnaires. The interview focused on the participants' deadline attitudes and experiences now and in the past. The questionnaires included an ad hoc biographic questionnaire, the State and Trait Anxiety Inventory (STAI) [9], and the Big Five Inventory (BFI) [5]. We used STAI to measure trait anxiety with score range [20 - 80]. We used BFI to measure the following personality factors:

BFI-Agreeableness: The level of participant's friendliness with score range [9–45].

BFI-Conscientiousness: The level of participant's organized nature with score range [9–45].

BFI-Extraversion: The level of participant's outgoing nature with score range [8–40].

BFI-Neuroticism: The level of participant's nervousness with score range [8–40].

BFI-Openness: The level of participant's curiosity with score range [10–50].

METHODS

We formed a cross-disciplinary, close-knit team that included an affective computing researcher, a data scientist, and a cartoonist/computer graphics researcher. We carried out the following analysis-synthesis steps:

- (1) We watched multiple times the recorded facial and OT videos. Based on shared observations, we produced a summary video for each participant featuring a split screen, which synopsized on the left/right the participant's representative expressions and postures before/after the deadline. These summary presentations, lasting 1 minute each, followed the actual timeline, and thus served as short visual stories.
- (2) We tried to interpret and expand on these visual stories, by taking into account not only the participants' facial expressions and mannerisms, but also their interview, biographic, and psychometric data. Through this synthesizing process, we selected key frames from each visual story and annotated them with fictionalized dialogues, thus composing dramatized biographies.

- (3) We turned the dialogued key frames into cartoon frames maintaining the participants' facial expressions and mannerisms, but changing their physical characteristics. We then used these cartoon frames to create comic strips.

ANALYSIS

Visual analysis picked on participants' gesture patterns. In this respect, the most telling indication of the participants' tumultuous state was their engagement in intense and frequent face touching in the days leading to the deadline. By contrast, such mannerisms were largely absent in the days after the deadline had passed. Face-touches and posture shifts are types of self-regulatory movements and are likely associated with psychological and cognitive processes [6]. The participants frequently rubbed, scratched, and caressed their face (Fig. 1), or groomed their hair. Psychological research has found such face touches to denote underlying negative affect, anxiety or discomfort and are thought to provide comfort and release emotional arousal [3]. The latter point was corroborated by the observation of perspiration traces on participants' faces, which is a telltale sign of hyperarousal [1, 8]. Certain other observed touches, such as hand covering of the face (Fig. 1), are manifestations of participants' attempts to shield themselves from distractions and focus on the problem at hand [2].

From the interviews, it was clear that all participants believed in the value of start working early towards a deadline, but even when they did that, they often experienced unexpected hurdles. "It never goes smoothly, no matter what", one participant exclaimed. Participants spoke emotionally about the cost of these hurdles. "When things go wrong and the deadline approaches, you feel helpless and alone", a participant stated. Additionally, participants complained about anonymity requirements that perplex submissions, inviting last minute errors. They also voiced exasperation over distractions and the inability to control communications in the days leading to deadlines.

From the biographic and psychometric questionnaires, it was clear that the participants represented four distinct career and psychological profiles, thus offering a diverse set of case studies. One of the few attributes participants had in common was that they were all agreeable, with scores in the tight range [32-35], which is on the high end of the [9-45] BFI-Agreeableness scale. This result is consistent with the profile of all four participants as practicing team science researchers, where agreeableness is a constitutional professional characteristic [7].

Analytic Cross-pollination

The cross-disciplinary collaboration behind the present work weaved together typically siloed perspectives, suggesting an analytic methodology that would be mutually beneficial to human-centered studies and cartoon art:

Benefits to human-centered studies: The collective visual analysis brought to the fore that in the days leading to the deadline participants had untidy hair, were largely dressed in dark clothes, and the two male participants were unshaven. In contradistinction, after the deadline passed, participants had tidy hair, were largely dressed in light-colored clothes, and the two males were shaven. Irrespective of whether these

behaviors would generalize in a larger study, they are linked to observations typically associated with an artistic eye; still, they can be of great use in human-centered analysis. Moreover, the data-driven artistic depiction of displayed emotions facilitates participant anonymization without compromising the value of the observational information.

Benefits to cartoon creations: The cartoonist found very useful the frame by frame analysis of real people's faces and poses while they engage in critical activities. "Cartoonists and comic book artists usually depend on a static model or their imagination to render human depictions", he said. He then added: "The face frame sequences provided me the nuanced evolution of raw emotions. Our brains cannot do this - they simply extrapolate. The emotional accuracy of the resulting comic strips is unlike anything I have done before."

SYNTHESIS

The comic strips tell four compelling stories with which many HCI and other researchers are likely to relate. The stories are meant to elicit compassion, amusement, and desire to study deadline behaviors in more depth, as a step towards designing empathetic interfaces. As an introduction to the comic strips, we provide short data-driven descriptions of the participants who served as inspiration for the fictionalized stories:

P1: Senior male computer science faculty with normal anxiety levels [STAI=38] and high degree of openness [BFI-Openness=48]. He was working towards a paper deadline. Although highly conscientious [BFI-Conscientiousness=41], P1 started working late on the said deadline and faced difficulties. His paper was rejected. Figure 2 presents in two pages the comic strip associated with the fictionalized story inspired by P1.

P2: A female postdoc from psychology. She was highly sociable [BF-Extraversion=40], highly conscientious [BFI-Conscientiousness=41], with normal anxiety levels [STAI=35], and a very calm personality [BFI-Neuroticism=16]. P2 was working towards a paper deadline. She started working early on the paper, but she still faced some issues. Her paper was eventually accepted. Figure 3 presents the comic strip associated with the fictionalized story inspired by P2.

P3: A junior female faculty from education, who was working towards a paper deadline. P3 had slightly elevated anxiety levels [STAI=41], and she was very much into yoga, walking, and healthy food as ways to control stress and promote well-being. Like P1 and P2, P3 was highly conscientious [BFI-Conscientiousness=40]. She started working early on the paper, but she still faced some issues. Figure 4 presents the comic strip associated with the fictionalized story inspired by P3.

P4: A junior male faculty from natural sciences with an introvert [BF-Extraversion=11] and highly anxious personality [STAI=56]. P4 was working towards a proposal deadline. This was one among many funding proposals he submitted during the year, as he was gearing up for his tenure promotion. His proposal was rejected. P4 had a very low conscientiousness score [BFI-Conscientiousness=20],

which may partly explain the apparent lack of direction in his proposal strategy. Figure 5 presents in two pages the comic strip associated with the fictionalized story inspired by P4.

In the Appendix, Figs. A.1 - A.4 convey aspects of the creative process that led to the construction of the comic strips in Figs. 2 - 5.

EPILOGUE

Deadlines play a crucial role in HCI research and the production of science in general. Despite the importance and ubiquity of deadlines, they are understudied, particularly from the human-centered point of view. Here, we carried out a field study, collecting observational and profile data from four academic researchers as they were negotiating paper and proposal deadlines. Following a novel method that combined study analysis with artistic synthesis, we constructed four comic stories inspired by actual data, but fictionalized for dramatic effect. Despite individual differences, the four stories (and the data behind them) invariably convey the toll deadlines take on researchers, confounded by personality traits and career demands. As scientists battle against time pressure, negative emotions, and unexpected hurdles on their path to a successful submission, there is only one entity that is constantly close to them, that is, their computer. At the moment, this entity has a passive presence. We hope that this work will motivate HCI researchers to launch studies that will bring into being affective interfaces for research deadlines. Such a development would stand to improve both the quality of science, as well as the quality of scientists' lives.

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A APPENDIX

Tightly packed sequences of the frames used in the comic strips. The frames are presented in chronological order to facilitate mental animation.



Figure 2: Comic strip inspired by the story of participant P1 - marching towards meeting his deadline.

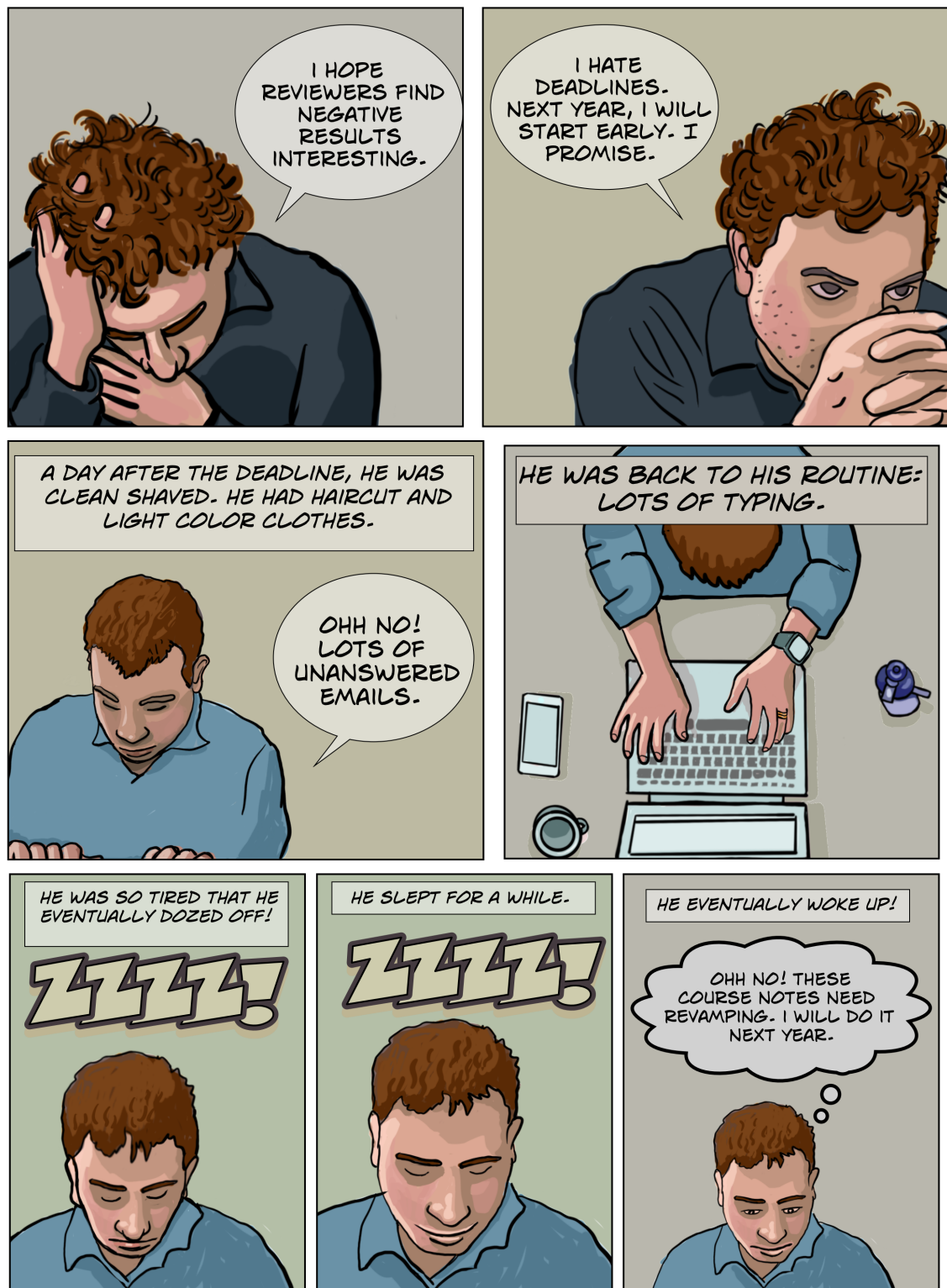


Figure 2: Comic strip inspired by the story of participant P1 - transitioning to post-deadline life (cont.).

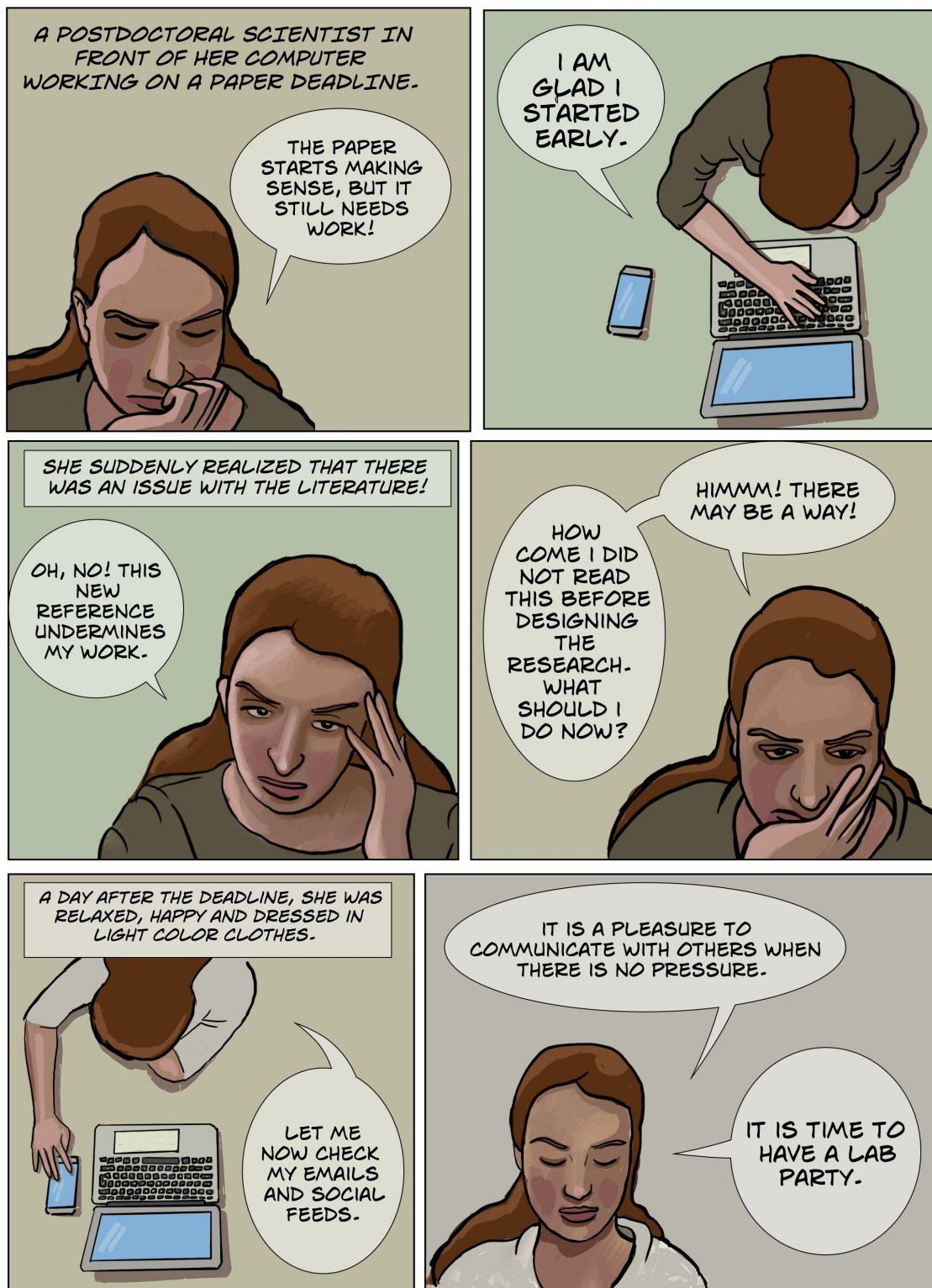


Figure 3: Comic strip inspired by the story of participant P2 - before and after the deadline.



Figure 4: Comic strip inspired by the story of participant P3 - before and after the deadline.

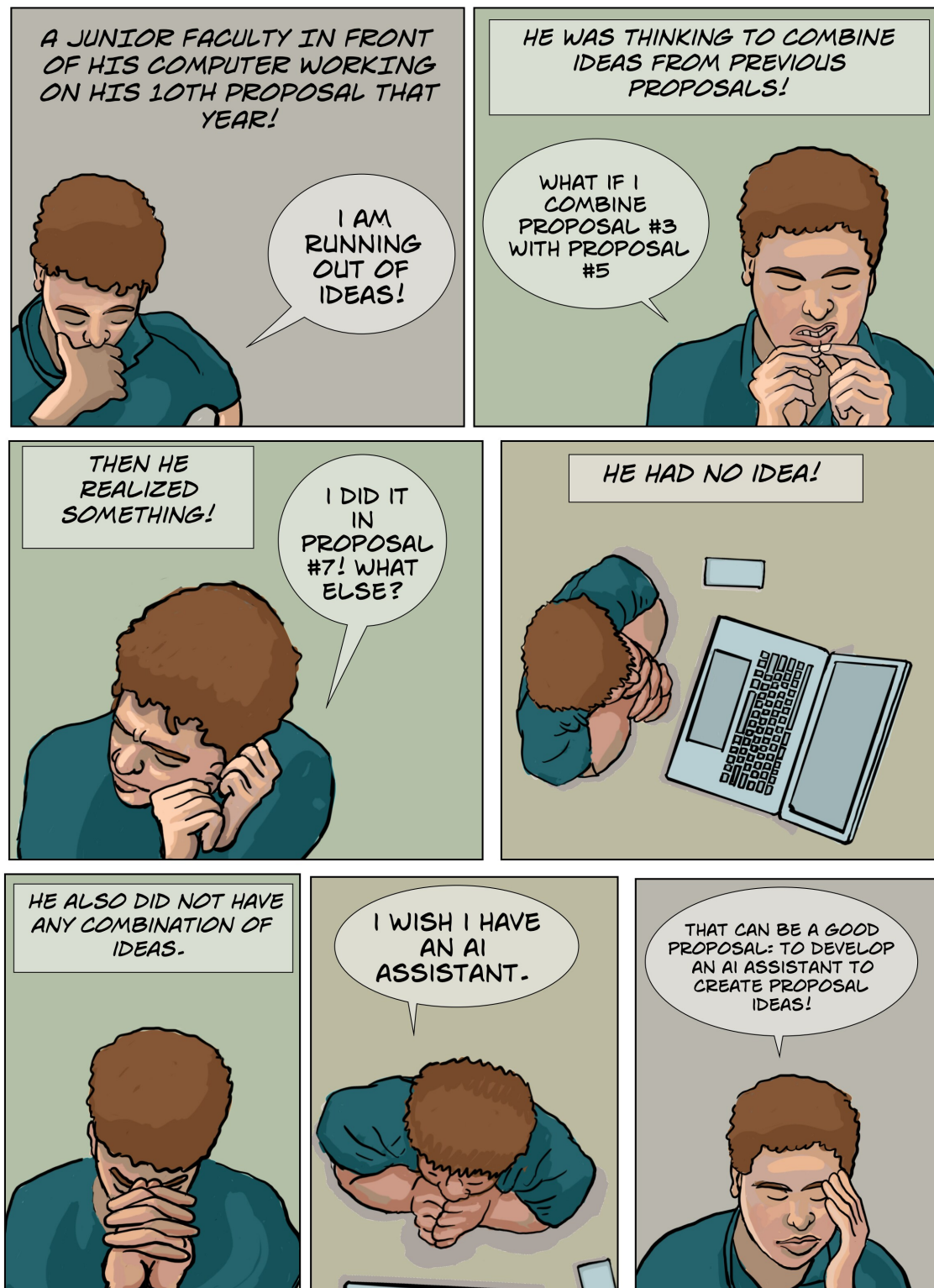


Figure 5: Comic strip inspired by the story of participant P4 - marching towards meeting his deadline.

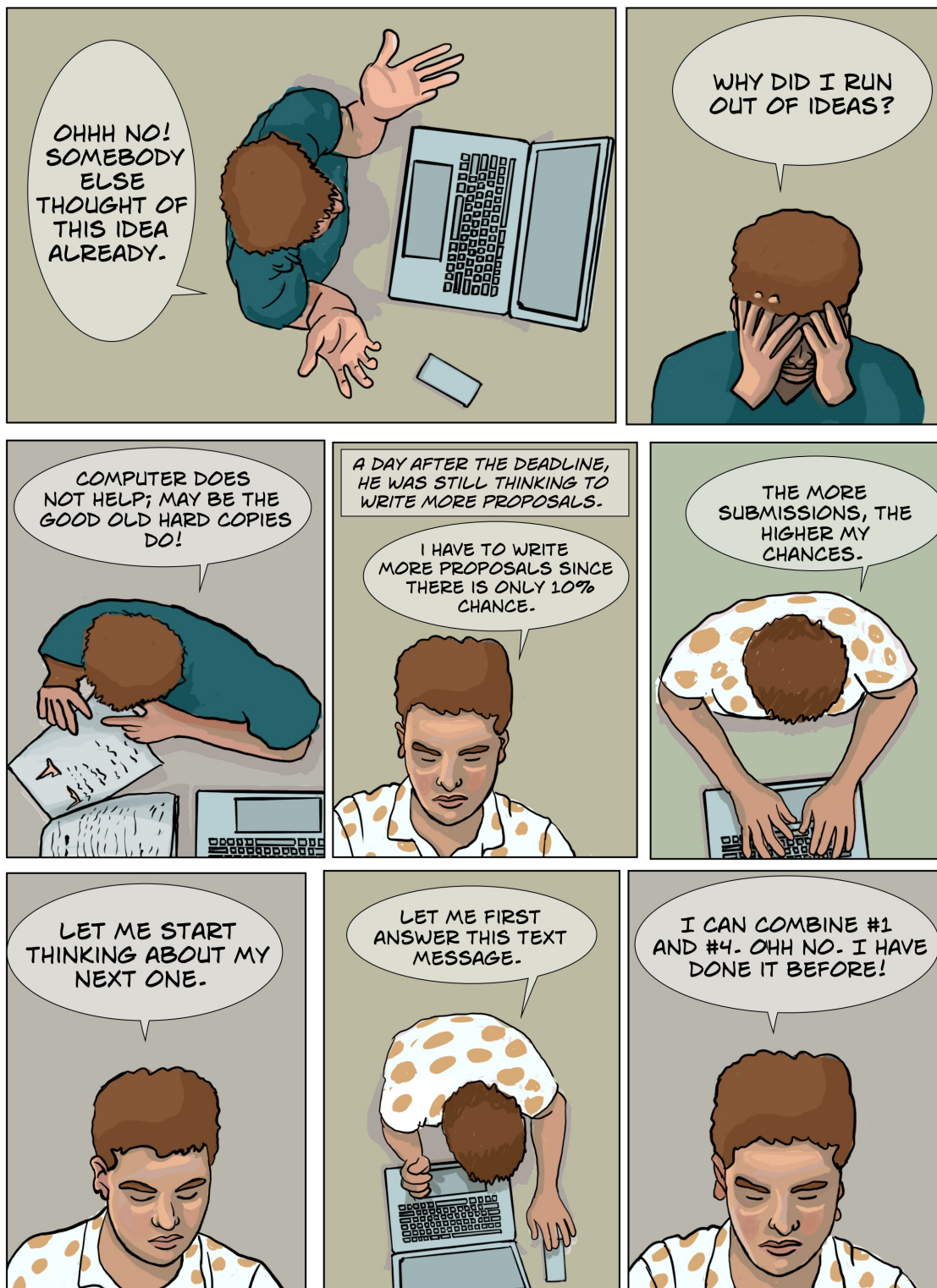


Figure 5: Comic strip inspired by the story of participant P4 - transitioning to post-deadline life (cont.).



Figure A.1: A sample of cartoon frames inspired by the face & OT video observations of participant P1 before and after his paper deadline, dressed in dark and light-colored clothes, respectively. Most of these frames were used to construct the comic strip in Fig. 2.



Figure A.2: A sample of cartoon frames inspired by the face & OT video observations of participant P2 before and after her paper deadline, dressed in dark and light-colored clothes, respectively. Most of these frames were used to construct the comic strip in Fig. 3.



Figure A.3: A sample of cartoon frames inspired by the face & OT video observations of participant P3 before and after her paper deadline, dressed in dark and light-colored clothes, respectively. Most of these frames were used to construct the comic strip in Fig. 4.

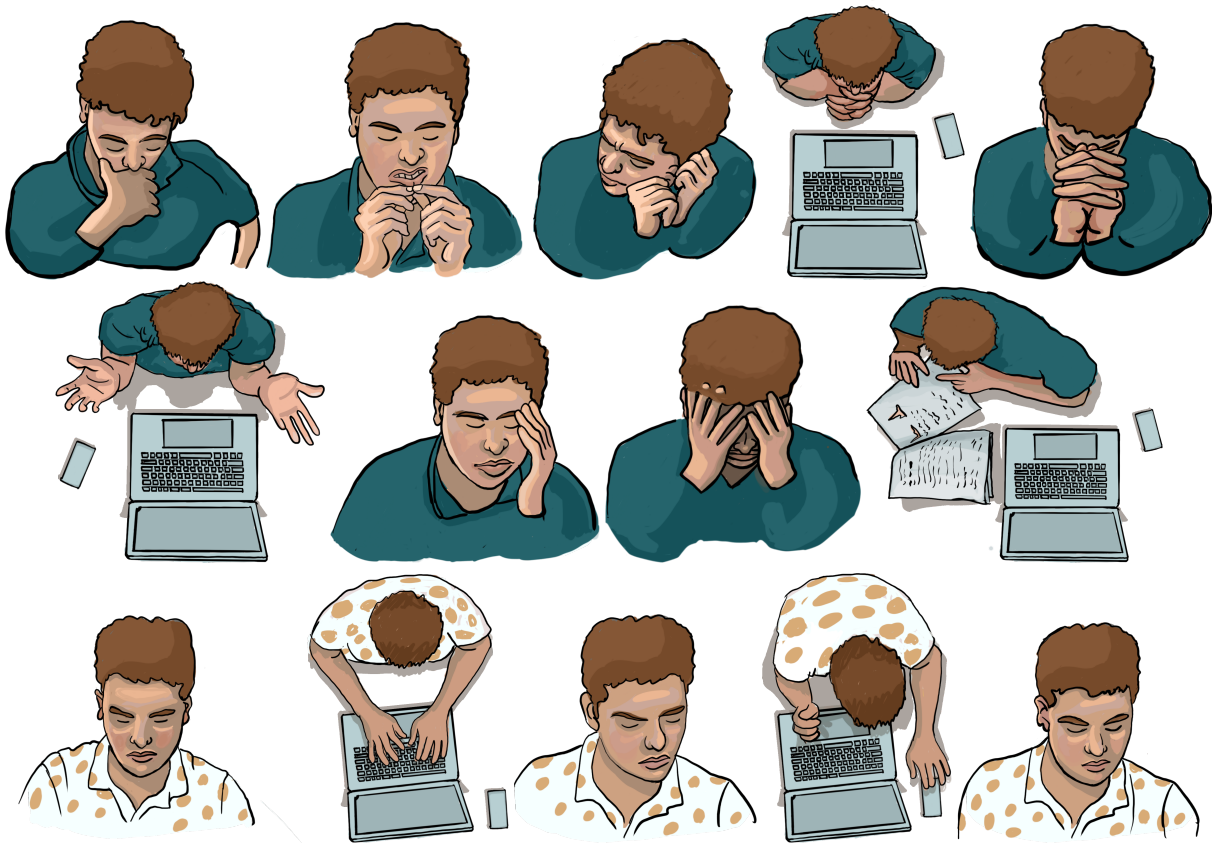


Figure A.4: A sample of cartoon frames inspired by the face & OT video observations of participant P4 before and after his proposal deadline, dressed in dark and light-colored clothes, respectively. Most of these frames were used to construct the comic strip in Fig. 5.