A picture is worth a thousand words: Pictorial scales for the assessment of work intensity

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Abstract

In the field of work and organizational psychology, verbal questionnaires provide a solid and valid foundation for the assessment of working conditions and employees' attitudes. In the view of practitioners, these instruments are often too long, requiring a lot of time to complete, and employees might resist the invitation to participate in frequent surveys. To address these drawbacks, we present an alternative approach and describe the development of pictorial scales for the assessment of work intensity. Pictorial scales provide a simple and inviting format for the assessment of work intensity, and therefore, are a suitable instrument for practice-oriented formats such as interviews or workshops. Moreover, pictorial scales have advantages in repeated assessments such as in diary studies.

Keywords: work intensity, work intensification, work demands, pictorial scales, interview guide, workshop material, diary studies

Introduction

Research in work and organizational psychology requires reliable psychometric instruments for the assessment of work-related constructs and employees' attitudes. Thereby, the majority of research relies on verbal questionnaires that provide a solid foundation for the assessment of psychological constructs and have proven themselves in research and practice. The development and validation of questionnaires follow established methodological criteria ensuring the psychometric quality of the instruments. However, practitioners often react less than positively when faced with implementing validated questionnaires. Typically, they say things such as: *"The questionnaire is too long! Our employees do not have the time to answer that many questions. The questionnaire contains items asking for similar things! Please remove these redundant items."* In most cases, practitioners can be swayed if one explains that the questionnaire was intentionally constructed in this particular way to ensure accuracy and validity. However, there is another potential issue with frequently asking employees to answer long questionnaires: they can lead to survey fatigue, and employees might resist following an invitation or stop answering a questionnaire prematurely. Against this background, short questionnaires are recommended, especially in the case of repeated assessments such as in diary studies (Ohly et al., 2010).

To address these practitioner concerns, we present an innovative approach to the assessment of psychological constructs in the context of work and organizational psychology. In particular, we describe the development of pictorial scales for the assessment of work intensity. These pictorial scales are meant for cases where a concise instrument is needed and are well suited for initiating discussions, for example, in workshops.

Pictorial scales in psychological assessment

Pictorial scales have been used widely in research and practice. In a recent literature review on pictorial scales, Sauer et al. (2021) reported that most of these scales assess emotional states, followed by scales for medical diagnoses. For example, scales to measure pain by showing faces which are more or less distorted by pain tend to be widespread. Interestingly, pictorial scales have been shown to be suitable for certain target groups, especially younger children who can express feelings and their intensity only to a limited extent (Sauer et al., 2021). A systematic review of face pain scales for children confirmed

that they met psychometric requirements (Tomlinson et al., 2010). Beyond that, various pictorial anxiety scales were developed especially for children (Kaur et al., 2016; Liszio et al., 2020) and there are even possibilities to measure children's personality traits with pictorial scales (Mackiewicz & Cieciuch, 2016).

Pictorial scales have also been developed for adults, many of them representing alternatives to existing verbal questionnaires for use in clinical settings. For example, Ghiassi et al. (2010) developed a pictorial version of a sleepiness scale showing a person in different situations such as sitting on the sofa or watching TV. In each situation, the sitting position represents different levels of sleepiness in four gradations. At the lowest level of sleepiness, the person sits upright, whereas at the highest level the person is shown slumped over. Ghiassi et al. (2010) were able to demonstrate that this scale provided comparable results to a corresponding verbal questionnaire. Also, the perception of pain is sometimes measured by using pictorial scales. For example, Cook et al. (2018) developed an alternative to language-based questionnaires for assessing functional interference from chronic pain. This scale shows a person in different situations such as climbing stairs or carrying shopping bags. For every situation the two extreme scores of the five-point Likert scale are anchored with pictures showing the person either exhibiting no pain or significant pain while engaging in the respective activity. The frailty scale by Theou et al. (2019) is another example showing that pictorial scales can be useful for target groups that have communication difficulties, such as older people who have difficulties answering verbal scales due to dementia. This scale shows typical situations (each described via five images which represent the answering choices) such as daytime tiredness or difficulties in memory. Other examples of pictorial scales that have been proposed as alternatives to verbal scales are scales for measuring emotions in response to an event (Bradley & Lang, 1994) or for capturing moods (Wong, 2021). Both scales use gradual sequences of images that work via metaphors, such as a volcano (representing the anger dimension; Wong, 2021) or an increasingly large image of a person (representing the dominance dimension; Bradley & Lang, 1994).

In the context of work and organizational psychology, the probably best-known pictorial scale goes back to Kunin (1955), who assessed job satisfaction using a series of smiley faces with different mouth curves ranging from the corners of the mouth turned clearly downwards to the corners of the mouth turned upwards. Another example by Maes et al. (2018) assessed women's work burdens using pictorial answering categories showing a woman carrying a sack, with the sack getting bigger and heavier in each image. Recently, Lambusch et al. (2020) published a pictorial scale to capture human energy in the

workplace based on the metaphor of batteries with different charge states. In particular, the momentary level of energy is captured by battery icons as known from smartphones with the charging level ranging from one to five bars. In concluding their review, Sauer et al. (2021) stated that pictorial scales are underrepresented in the field of work psychology and that, especially the measurement of constructs such as workload would benefit from pictorial scales. Following this call, we describe the development of a pictorial scale for the assessment of work intensity.

Work intensity in the workplace

The ongoing evolution of information and communication technologies has expanded and shaped our ways of communication and collaboration (Korunka & Kubicek, 2017). Work settings have changed due to increased flexibility both concerning work locations and working hours. Moreover, due to the Covid-19 pandemic, working from home and in the evening have become the new reality for a large proportion of the workforce. These changes may also result in a higher intensity of work (Korunka & Kubicek, 2017). Work intensity is often described as 'working hard' including working for a longer time at an intense level of effort (Burke et al., 2010). However, the notion of "work at high speed and to tight deadlines might not fully capture the complexity of work intensity in its many job-specific forms" (Piasna, 2017, p. 171).

With the objective of a broader conceptualisation of work intensity, Soucek and Voss (2022) conducted a comprehensive literature review and ran workshops with employees, employee representatives and management (e.g., work councils, occupational health management). Based on this work, Soucek and Voss (2022) developed a questionnaire on work intensity that includes 21 items and measures seven facets of work intensity. Specifically, work intensity is associated with a high quantity of tasks that occur in a certain period (*amount*), that have to be completed in parallel (*concurrency*) or occur temporarily clustered (*work peaks*). Likewise, a high degree of coordination with colleagues is another characteristic of work intensity (*interdependence*). Other facets relate to a high degree of interruptions (*interruptions*), ambiguous tasks (*lack of clarity*) and accessibility for professional matters outside regular working hours (*extended availability*).

New ways of work, characterised by digitalisation and flexibilisation, have often been associated with higher work intensity which may lead to negative consequences for employee well-being and performance. For example, Soucek and Moser (2010) have

shown email communication to be related to information overload. In particular, the characteristics of email communication such as a simplified distribution of messages to a large number of recipients are accompanied by different facets of information overload such as a large number of incoming messages or deficient communication quality. Further, Reinke and Chamorro-Premuzic (2014) have shown that email overload was related to burnout and several other studies have associated the notion of 'too much technology' with lower levels of mental health and productivity (e.g., Diaz et al., 2012; Mano & Mesch, 2010; Reinke & Chamorro-Premuzic, 2014). Moreover, Stadin et al. (2016) reported a positive relationship between demands from information and communication technology (ICT) and psychological strain. Based on data from the Swedish Longitudinal Occupational Survey of Health, 14,757 employees responded to measures of ICT demands (e.g., "too many calls and emails" or "claims to be available on work-related issues during leisure time", Stadin et al., 2016, p. 1051), which were related to job strain (e.g., *"Do you have to work intensively?"*, p. 1051) and self-rated health (*"How would you rate your general state of health?"*, p. 1052). Overall, previous studies seem to suggest that new ways of work are associated with higher work intensity which might have negative consequences for well-being.

However, previous research has been fuzzy in the conceptualisation and measurement of work intensity. In particular, previous measures of work intensity include their antecedents or consequences. For example, questions such as *"Due to digital technologies at the workplace, I have more work than before"* (Borle et al., 2020, p. 380) include antecedents of work intensity such as the advancing digitalisation and flexibilisation of work in the measurement of work intensity. Other questionnaires include negative consequences, such as an impairment of employees' mental health in the measurement of work intensity (e.g., *"The time intensity of my work has become more stressful"*, Neirotti, 2017, p. 1970). These different operationalisations illustrate that no clear differentiation is made between causes, forms and consequences of work intensity.

For the sake of a conceptual clarification of work intensity, Soucek et al. (2022) developed a process model that explicitly distinguishes between causes, forms and consequences of work intensity (see also Soucek & Voss, 2020). Among the causes, the model included new ways of work that are characterised by, for example, digitalisation and flexibilisation. These factors are initially neither good nor bad, but can result in work intensity that is perceived as stressful, which in turn can endanger employees' psychological well-being and performance. This distinction is important because new ways of work do not necessarily lead to high work intensity, but depend on other factors, such as

organizational strategies or the decision latitude of the employees (Soucek & Voss, 2020).

This model conceptualises work intensity as including the seven facets described above and reflected in the questionnaire on work intensity (Soucek & Voss, 2022). In order to avoid double-barrelled items, the wording of the items deliberatively relates neither to causes nor consequences of work intensity. In this way, Soucek and Voss (2022) addressed shortcomings of existing measures that did not differentiate between causes, forms and consequences of work intensity.

Pictorial scales on work intensity

The questionnaire on work intensity by Soucek and Voss (2022) that distinguishes between seven facets of work intensity, served as the basis for the development and validation of a pictorial scale measure of work intensity. The development and validation of the pictorial scales followed the propositions of Sauer et al. (2021) and consisted of three steps, namely, item generation, interpretation check, and scale validation. In the first step, items were generated in discussions with students and scientific experts, and several pictures were drafted for each dimension of work intensity. In the next step, employees and Human Resources professionals were asked for their interpretations of the pictures. Based on their feedback and the assessment of psychometric properties of the pictorial scales (i.e., item analysis), the pictures were revised and refined. Afterwards, 173 medical students were invited to describe the contents of the pictures to validate the intended content. Their description of the pictures partially led to another modification of the pictures. A similar study included 118 students with work experience. In the last step, the final version of the pictorial scales was validated with a study involving 335 employees who answered the verbal questionnaire and the pictorial scales on work intensity. The results of a confirmatory factor analysis showed that the seven dimensions of work intensity as assessed by the verbal questionnaire were significantly related to the assessment resulting from the pictorial scales (convergent validity). Thereby, the differentiated assessment of the seven dimensions of work intensity was not blurred by the two survey formats (discriminant validity). In summary, the pictorial scales proved as suitable as the verbal questionnaire to assess the seven dimensions of work intensity in a differentiated manner (Soucek & Voss, 2022).

The pictorial scales on work intensity consist of seven series of pictures that represent the seven dimensions of work intensity. Each scale consists of five consecutive pictures

following the idea of a Likert scale with a linear increase in content between the pictures. For example, Figure 1 shows an example of the series of pictures for the "Amount" dimension. In these pictures, yellow sticky notes are symbolizing work tasks. The increase in task quantity is illustrated by adding two tasks to each subsequent picture starting from three tasks in the first picture on the left side.

Figure 1
Pictorial scale on work intensity: Amount (Soucek & Voss, 2021)

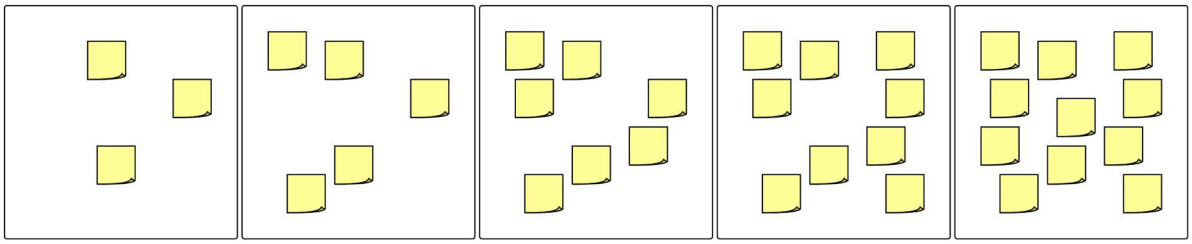
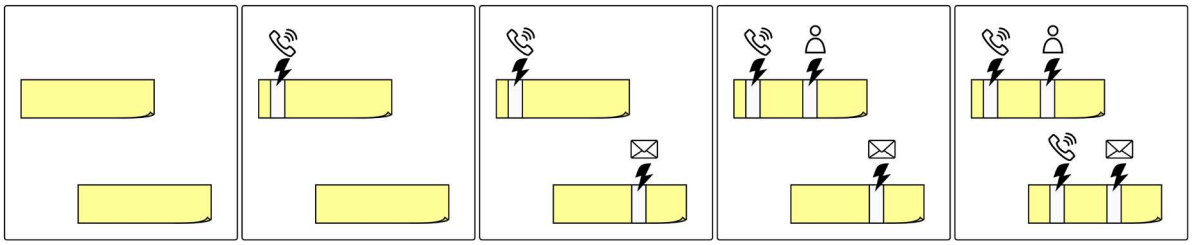


Figure 2 shows the sequence of pictures for the dimension "Interruptions". Again, yellow sticky notes are representing work tasks that are interrupted by various events, such as telephone calls, emails or visits from colleagues. Please note that the number of interruptions increases linearly from left to right; in each picture, an additional interruption occurs.

Figure 2
Pictorial scales on work intensity: Interruptions (Soucek & Voss, 2021)



The pictorial scales on work intensity were published by Soucek and Voss (2021) under a CC BY-NC-ND license (Creatives Common: Attribution, NonCommercial, NoDerivatives; https://creativecommons.org). This licence permits redistribution of the pictures with attribution to the creator, but no editing or commercial use. The pictorial scales are accessible via the following link: https://doi.org/10.17605/OSF.IO/93KTQ (Soucek & Voss, 2021). The following sentence serves as an instruction for participants: "Please select

the picture that most closely matches the situation in your workplace." The full scale, including all facets of work intensity, can be found at the end of the paper.

Application of the pictorial scales

The pictorial scales are a simple and concise instrument designed to invite employees to participate in workshops and surveys on the topic of work intensity. The instrument can be used as a diagnostic for work intensity, but it can also serve as useful input for interventions. The visual representation of several facets of work intensity is intended to stimulate discussions, and thus, contributes to an exchange of interpretations and assessments. Thus, by using the pictorial scales a discussion is initiated that can contribute to a shared understanding of work intensity and its facets. In the following, we will describe possible scenarios that can benefit from using the pictorial scales.

Interviews

The pictorial scales can be used in interview guides to provide a visual impression of the topic at hand. Instead of the interviewer just reading out a question, the pictorial scale could be printed on the interview sheet for illustrative purposes. This can benefit both the interviewer and the interviewee. For instance, the scale can help the interviewer with providing a vivid explanation of the respective facet of work intensity. In turn, the interviewee gets more inspiration from the pictorial representation, which might facilitate finding work-related examples. Explaining the question with the help of pictures is especially useful when interviewing people who speak a different language or have limited language skills. Such interview guides could be used in the context of occupational health management or by company doctors.

Workshops

Another setting where the pictorial scales are useful are workshops. The pictures could be used, for example, on pinboards as part of visual queries. For instance, the moderator of the workshop can draw one line for each dimension of work intensity on a pinboard and use the pictures as anchors for these scales. Subsequently, workshop participants are invited to assess each dimension of workplace intensity by covertly placing a dot somewhere along the respective scale. After every participant has placed their respective dots, the wall is uncovered for all to see. The workshop moderator can then compare

the variability in the participants' answers for each scale. Thereby, a low variance in the answers indicates a similar understanding of the respective dimension of work intensity. If the assessments are very different, this may be an indication of different interpretations of the pictures. By inviting workshop participants to share their interpretations of the pictures, a team could create a common understanding of the work intensity situation in their team or organization.

Diary studies

Finally, another scenario for the application of the pictorial scales are diary studies. In diary studies, participants repeatedly answer questionnaires, for example, at the end of every work day. Because of this frequent assessment, questionnaires have to be concise in order to avoid hampering participants' motivation and compliance over time. Due to the visual representation, pictorial scales can be processed and completed more quickly than written items. Critics could argue that the pictorial scales cannot be used meaningfully without further explanation by an interviewer or in the context of a workshop because every person differs in the interpretation of the pictures. However, the objective of diary studies is to examine changes over time as perceived by every participant. Thereby, different mean levels of participants' responses as a result of their unique interpretation of the pictures are taken into account in the statistical analyses. Technically speaking, the statistical analyses of diary studies relate to within-subject effects while statistically controlling for between-subject effects by applying person-mean centring. Nevertheless, the meaning of the pictorial scales can be briefly explained at the beginning of the diary study to ensure comparable interpretations among the participants. Overall, the pictorial scales meet the demand of a simple and concise instrument that allows for repeated assessments, such as in the context of diary studies.

Conclusions

The present work follows the call of Sauer and colleagues (2021) who stated that pictorial scales are underrepresented in the field of work and organizational psychology. The questionnaire and pictorial scales on work intensity provide an excellent starting point to follow this claim because both instruments assess the same facets of work intensity with different methods. So far, empirical studies comparing verbal questionnaires and pictorial scales are rare in work and organizational psychology and future research should compare the particular strengths and weaknesses of these different formats. Also, the

development of the pictorial scales on work intensity may inspire researchers to apply this methodological approach to other constructs in work and organizational psychology.

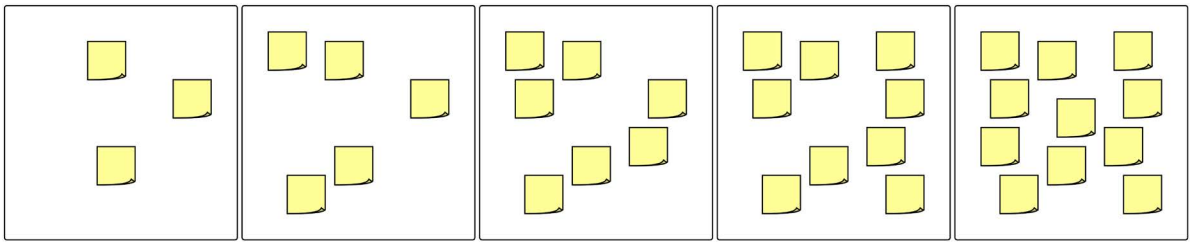
From a practitioner's perspective, pictorial scales are an innovative and important supplement to verbal questionnaires. Pictorial scales are not intended to replace verbal scales, but could compensate for some disadvantages of verbal questionnaires in certain scenarios. In line with Sauer et al. (2021), we propose that pictorial scales are particularly suitable for use in interviews and workshops where respondents may have limited language skills or situations where there is a need to measure a construct several times such as in diary studies. Overall, the pictorial scales provide a simple and inviting format for the assessment of work intensity, and therefore, are a suitable instrument for practice-oriented formats. We have reproduced the full scale below for your information.

Full pictorial scale (Soucek & Voss, 2021)

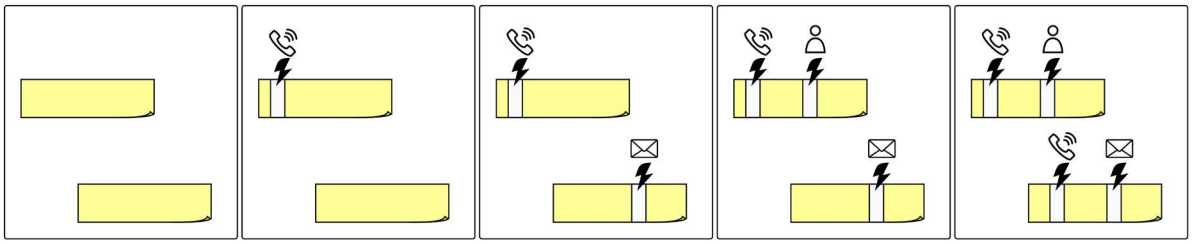
Instructions

Please select the picture that most closely matches the situation in your workplace.

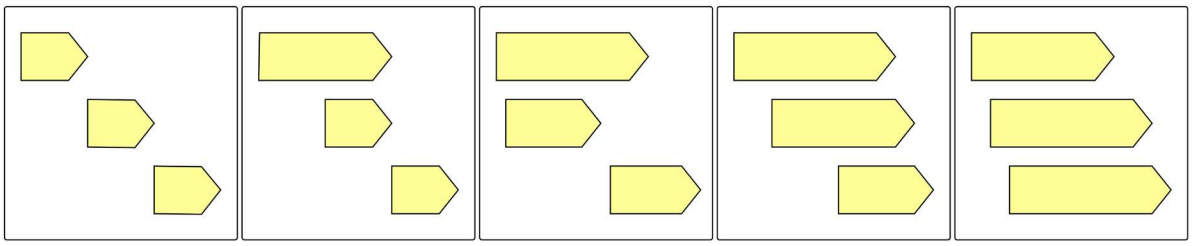
Amount



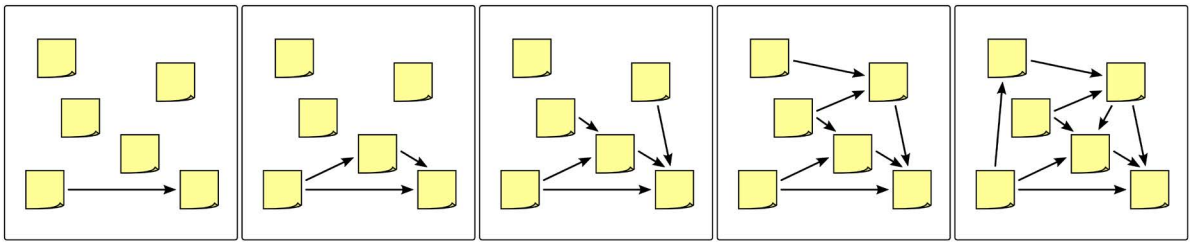
Interruptions



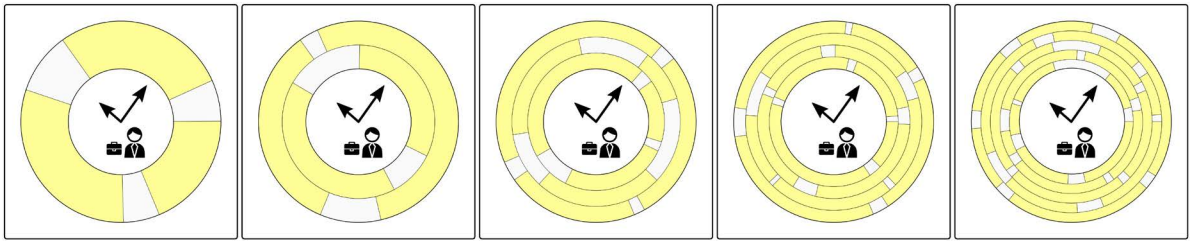
Concurrency



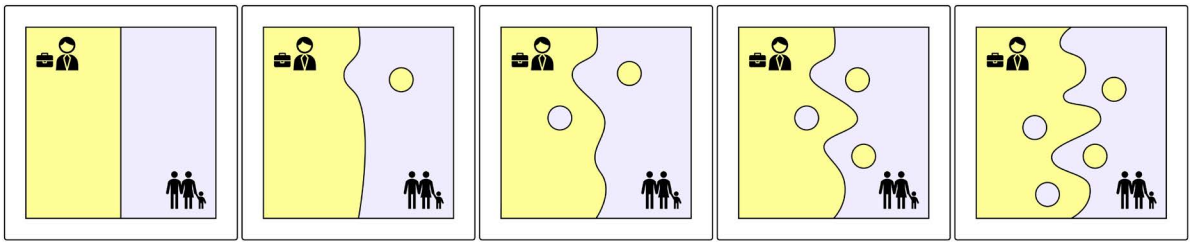
Interdependence



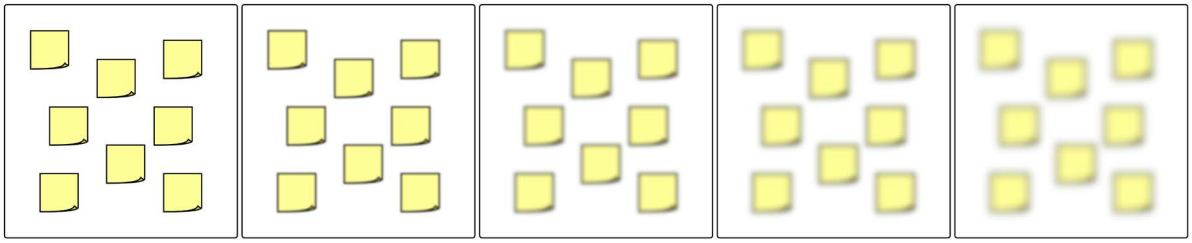
Work peaks



Extended availability



Lack of clarity



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