

Definitions of mental workload psychology essay



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Despite the importance of the topic for the past 40 years, there is no clearly defined, universally accepted definition of workload. Huey and Wickens (1993, p. 54) note that the term “ workload” was not common before the 1970’s and that the operational definitions of workload from various fields continue to disagree about its sources, mechanisms, consequences, and measurement.” Workload aspects seem to fall in three broad categories: the amount of work and number of things to do; time and the particular aspect of time one is concerned with; and, the subjective psychological experiences of the human operator (Lysaght, Hill et al. 1989).

Workload is thought of as a mental construct, a latent variable, or perhaps an “ intervening variable” (Gopher and Donchin 1986, p. 41-4), reflecting the interaction of mental demands imposed on operators by tasks they attend to. The capabilities and effort of the operators in the context of specific situations all moderate the workload experienced by the operator. Workload is thought to be multidimensional and multifaceted.

There is no agreed-upon definition of mental workload. The main reason is that there are at least two theoretically well-based approaches and definitions: Mental workload as viewed in terms of the task requirements as an independent, external variable with which the working subjects have to cope more or less efficiently. In another meaning, mental workload as defined in terms of an interaction between task requirements and human capabilities or resources (Hancock and Chignell 1986; Welford 1986; Wieland-Eckelmann 1992).

Workload results from the aggregation of many different demands and so is difficult to define uniquely. Casali and Wierwille (1984) note that as workload cannot be directly observed, it must be inferred from observation of overt behaviour or measurement of psychological and physiological processes. Gopher and Donchin (1986, p. 41-2) feel that no single, representative measure of workload exists or is likely to be of general use, although they do not provide guidance on how many workload measures they feel are necessary or sufficient.

There are few formal definitions of workload. Most definitions are of the form: "Mental workload refers to the portion of operator information processing capacity or resources that is actually required to meet system demands." (Eggemeier, Wilson et al. 1991, p. 207). Besides, Gopher and Donchin (1986, p. 41-3) note that "mental workload may be viewed as the difference between the capacities of the information processing system that are required for task performance to satisfy performance expectations and the capacity available at any given time."

2. 2 High, moderate and low mental workload

Mental workload is different constructs of behaviour and performance, as well as the constructs measured by triangulation from physiology, performance, and subjective evaluation, coupled with task analysis and computation model (Wickens, 2000). At the most general level, mental workload can be described as the relation between the function relating the mental resources demanded by a task and those resources available to be supplied by the human operator.

The solutions or remedies suggested by inadequate performance not necessarily the same as those proposed by the excessive diagnosis workload. For example, a reduction in performance can result from an inadequate face. If critical information is displayed in a location where it cannot be accessible or not represented in the acronym that is understandable, this is not a workload issue, but it certainly degrades performance. A computer mouse with high profit will create unstable target acquisition performance decrement but, again, not original workload problem (though poor performance can obtain subjective reactions seen a high workload). Instead, the environment task that requires the operator to hold large amount of information in working memory while further information or chatted clearly do not reflect the workload problem, although most operators are able to do so without making a lot of mistakes (as long as they do not interrupted by an unexpected new demand). Human manual control system with very high magnification view more clearly shows the dissociation between workload and performance. Such a system can produce very detect good performance (low error), but the resulting resource investment to correct even the smallest deviation will increase to a great extent experienced workload (Vidulich & Wickens, 1986,).

Another example of dissociation between workload and performance comes from the classic study of air traffic controllers by Sperandio (1971). As the task load on the operator increases, one might assume that the performance will decrease and increase in workload. However, Sperandio found that as the number of aircraft in their sector increases, the approach controller was assigned to give commands to the aircraft to maintain their performance at

the same level, even though they have a larger workload. Sperandio observed that the controller uses a variety of adaptation strategies, such as processing less variables aircraft and reduce verbal communication, to ensure stable performance under high workload. Therefore, building mental workload is important in understanding the relationship between objective workload and task strategy.

In addition of the example comes from normal daily activities: driving. The workload can be a better predictor of future performance drivers of their current performance. One can measure driver workload is too high (for example, using objective measures of physiological or secondary task) when the steering wheel and the speed is perfect and the car is properly and accurately following the road. In other words, a high workload can be accommodated without immediate consequences for performance. At some point later, however, the continued high workload experienced by the driver cannot allow him to respond effectively to the increasing demand for the unexpected; consequently, the car can veer into a ditch. Using simultaneous tasks with no foveal load (mental task), the study Recarte and Nunes (2000) and Recarte, Nunes, and Conchillo (in press) directly approach the relationship between attention and gaze in actual driving. Recarte and Nunes (2000) study the effect of different tasks on the mental visual behaviour and driving performance. Increased workload required by some mental tasks is reflected in a significant increase in pupil size, and some measures of visual search behaviour have also been affected by mental tasks. The effects of general spatial view of concentration (lower variability in the spatial view) and reduced inspection frequency mirror and speedometer, even with no

evidence of significant changes in the specific drive performance measures, such as speed. Task with high spatial picture content produced not only more pronounced effect but also specific pattern long fixations. To understand the importance of change is observed, two major issues need to be addressed: specificity of the effect of the difference between task and mental activity evaluation as potential distracter on road safety.

While in the different situation but in the same activity where the rapid development of portable and small electronic devices, mobile phone, iPod, GPS, etc. have increased opportunities for multitasking in everyday life. People can browse Internet, text each other, listening to music, video download, and get navigation directions, while all moving and simultaneously involved in other activities. Like multitasking could pose a threat to safety when done while driving and other ambulatory activities. Many studies have shown that degraded driving performance when drivers speak at mobile phone (even when using hands free devices)-performance decline due to competition for center source instead focus motor disorder (Horrey & Wickens, 2006). Interpretation resources for dual-task decrement have criticized for different performance-round allocation of resources, but the source is inferred from performance step (Navon, 1984). However, neuroergonomic measures can provide an independent assessment of resources competition and related areas of the brain involved in multitasking. Just and colleagues (2008), for example, using fMRI to carry out the simulation of driving alone and at the same time with auditory sentence task-validation. The important of its methodology is that both tasks typically activate non overlapping cortical network.

However, the parietal cortex, the brain region that is activated when driving alone, indicating additional low activation task understanding. This and other dual-task driving studies using different methods, for example Erps (Strayer, Drews, & Johnston, 2003), provide strong evidence for the interpretation of neural resources multitasking depletion. Although the results do not identify biological substrate of sources, but they provide independent verification and clarification resources weaken criticism (1984) Navon. Resource theory also important to applied topics related to multitasking, evaluation of mental workload of human (Wickens, 2002). Behavioural measures such as accuracy and response speed, has been widely used as a measure of workload.

However, neurocognitive measures offer some unique advantages, including the ability to obtain confidential information continued in the work environment in which measures behaviour blatantly may be quite rare, as the seat of the highly automated flight (Kramer & Parasuraman, 2007).

Another reason is that any measures that may be associated with neural theory of attention, thus allowing for the development of a theory neuroergonomic which in turn can develop practical applications involving mental workload assessment. For example, fMRI (Just, Carpenter, & Miyake, 2003) and neuropsychological (Previc, 1998) studies have supported theoretical difference between perception / cognition, verbal / visual-spatial, and focal / ambient processing resources, which component model (2002) Wickens' multiple sources.

Neuroergonomics also contribute to mental workload- assessment. Because operators unbalanced mental workload (either too high or too low) can be strict element in efficiency and safety of human-machine system, the

workload must be evaluated when designing a new system or evaluating available. Several studies have used EEG or Erps workload assessment. For example, the P300, a positive ERP wave raised by a low probability targets interspersed with more frequent non targets, reduced in amplitude when the focus diverted resources from target discrimination in dual-task situations (Kramer & Parasuraman, 2007). Schultheis and Jamieson (2004) used this method to evaluate mental workload demand multimedia educational system that combines text, graphics, and video. P300 amplitude auditory stimulus is sensitive to the difficulties presented by the text. The results indicate the possibility of adjusting the rate and difficulty such as multimedia systems to individual needs students. These studies demonstrate the value and limits neuroergonomic approach. Neuroergonomics not replace the conventional methods of behaviour analysis but provides additional tool that has been useful to both the filtration theory mental workload and in providing an alternative technique for assessment in the work environment.

2. 3 Summary

Studies we have described provide a solid base of empirical data that this task is a scientific basis for mental workload. It was suggested that these constructs are not expressed in terms of more basic psychological mechanisms. This is a legitimate concern, but the evidence is not support their view. All the constructs have been associated with information processing or other psychological processes (see Kahneman, 1973, and Wickens, 1984). Furthermore, some basic brain mechanisms have also been identified (see Kramer & Weber, 2000, and Parasuraman & Wilson, 2008). Finally, each building has successfully modelled computationally (see <https://assignbuster.com/definitions-of-mental-workload-psychology-essay/>

Wickens, 2002). These different methodologies provide converging evidence for the scientific viability of this build. Of course, this is not to say that there is complete agreement about the underlying mechanism or that future studies may not lead to componential structure revision or modelling these constructs is the nature of scientific progress. But their scientific status seems undeniable.