

## Most important classic concept in human factors and ergonomics

**Gary Klein** –So I really hate the idea of the most important, I mean I'm interested whether theories are proven or disproven so I don't know that this is the most important, but the one that I wrote about and it's about the, the importance of pattern change and expertise. That experts develop large vast repertoires or patterns and the work began really with the chess research of the de Groot, studying chess grand masters to see how they could handle complex situations, and you know marvelous records of their thought processes as they wrestle through these and then was picked up and amplified by Herb Simon, ah Chase and Simon and their work on pattern repertoires. And I think that's really a classical technique, a classical concept that has had a major impact.

**John Carroll** –I came up with two, these are not classic concepts in human factors though, they're just classical concepts I guess. And, the first one I picked was the Gotsky's concept that people are shaped by culture and his ideas about what we would call cognition are far broader than the concept of cognition that became popular here in the 1960's and that is probably the foundation of what most of us were trained in and I think that that is having a lot of influence in psychology, in sociology now and that's why I think it's a classic concept with, with legs. The other one which is maybe more forgotten is C. Wright Mills concept of middle level abstraction and I think this, to me this is illustrated by comments Chris and Gary were making about the role of theory in human factors. In the 1950's, C. Wright Mills who was a soc, one of the leading sociologists of his time learned the field against what he called grand theory and a number, he had a list of excesses that sociology might get bogged down in and what he said is that a useful social theory ought to be articulated at a middle level of abstraction that would be useful in doing things like framing policies or interventions. And I think quite often that's just the kind of problem we face and that we, we also need to guard against grand theory or the discourse of proving theory or ah, you know, defining the world through a single theory and, and focus more on middle level abstractions that are useful and combinable and one that I felt was a good example of his ideas today is pattern languages, the way they're used in software engineering, but also in several behavioral disciplines touching on software.

**Christopher Wickens** –Well, I really racked my brain on this one, um, perhaps influenced by George Miller and my intro course, I identified the limits of short term memory or working memory, the seven plus or minus two as being a really fundamental finding in information processing and human performance that's relevant, very relevant to human factors. We all know about forgetting things, forgetting information on one page of the screen when we go to another one. My focus on working memory limits and eventually other limits, other constraints in performances in some ways at odd or reciprocal to a focus that Gary Klein might take where he focuses on what's, the good of expertise and I focus on sort of the limits of novelties maybe you might say, I think both approaches are complimentary and interesting, um, and should work together, but really this has led me to look at not only the limits on working memory, but lost of other limits in human performance and this idea that as we increase demands of tasks on people we kind of reach a point where performance doesn't change and then all of a sudden performance begins to fall off, okay, you're up to about seven junks and then performance begins to fall off. And as I'll talk about tomorrow morning in a symposium,

we talk about this as kind of a red line of work load or red line of performance demands and I think understanding where this red line is, is important for theoretical reasons but it's turning out to be very important in human factors for those who need to certify, certification of equipment and certification of procedures as avoiding those that overload whatever the limits of human performance and cognition it is that we can define.

**Nancy Cooke** – I don't think that this is the most important, but it is an important concept and it's certainly inspired me lately, its Gibson's work on texture gradients and optical flow patterns that emphasize the importance of the context to the environment and active nature of the unit observer and you know when I was in graduate school I really didn't get it, what are you talking about optical flow patterns, but as I started working on applications that were more and more complex we couldn't help but notice that there's a lot of information in the environment that needs to be accounted for and the observer is not sitting still in an impoverished laboratory environment. And so I think that now I'm starting to get it and I'm really inspired by the ecological approach in general.

**Christopher Nemeth** – Thank you, other comments from members of the audience here in terms of most important classic concept you've found in your own practice...yes sir

**Audience Member 1** – Probably not at the level other people have it, but signal detection theory as a metaphor for thought

**Christopher Nemeth** – Signal detection theory as a metaphor for thought. And do you have a particular resource that you would recommend to others in order to learn more about it?

**Audience Member 1** – oh, gee, there's so many, go back to the classic book, but there are others there's a professor at NYU who has a particularly good discussion of it on his website, ah, Professor Heeger

**Christopher Nemeth** – Professor Heeger at NYU

**Audience Member 1** – yea, it comes, it just keeps coming across in my life and how I make decisions and the distinction between information and the distinction between the way you're drawing the criterion. It just keeps coming up.

**Christopher Nemeth** – okay the distinction between information and where you're drawing a criterion

**Audience Member 1** – yes

**Christopher Nemeth** – very good, thank you. I should mention it, restating it because not everybody in the back might be able to hear you so if it's alright with you I'll just kind of reiterate and make sure I get it right as well

**Audience Member 1** – perhaps you really didn't believe I was saying this (laughter)

**Christopher Nemeth** – I believe in it, so thank you so much for sharing it, other comments please. Yes, way in the back

**Audience Member 2** – I guess the maxim that's always guided a lot of my work (Inaud) too much of anything's too much.

**Christopher Nemeth** – too much of anything is too much, okay and do you have reference you would like to point us to in order to learn more about this?

**Audience Member 2** – I think Dr. Wickens work

**Christopher Nemeth** – Dr. Wickens work, alright, thank you for that.