Comments on Chi and VanLehn

Domain Shift in Cognition (AO)
In machine learning, the domain shift is defined as the set of problems where the distribution of the input changes, but the underlying/latent features are unaffected. Hence, inputs that are different on the surface but share similar deep features may yield the same result. Within the context of Chi and VanLehn's paper, the success of the student on transferring the knowledge from source to target depends on how well the student was able to learn the inherent structure.

Distinguishing How the Expert and Novice Gain Deep Understanding: Top-Down and Bottom-Up Approaches (GG)
The expert uses a top-down approach: using the problem statement, they invoke specific principles to infer the second-order relationships between the first-order cues (185). The novice, however, "cannot readily invoke the correct principle …. from a condition stated in the problem statement" (185). The author proposes a bottom-up approach of "first learning to derive the first-order interactions followed by noticing second-order relationships" (187).

AN INSTRUCTIONAL APPROACH BASED ON THE HYPOTHESIS OF PERCEIVING INTERACTIONS (SC) This paper reminds me of the paper written by Palmeri et al. [2] That paper told us about two methods namely object processing and perceptual categorization. A model tries to detect an object based on the various high-level vision in the object processing approach. Perceptual Categorization depends more on the representation of the object.

Top-Down and Bottom-Up Principle Transfer (DG)
One topic not addressed by Chi et al. is the transition from the Bottom-up to the Top-down approach of transfer. I posit one possible method for this transition is: the novice gradually builds a general rule based on the specific unidirectional inference rules encountered. when necessary, the novice may need to revise this model (as it may be inaccurate) or may be required to make assumptions using the model that are not necessarily implied by it (i.e. new hypothesis testing).

Chi and Van Lehn -- As Seen Through the Lens of Palmeri and Graesser (NK)
This seems to suggest that raw amount of factual knowledge may separate novice from expert, which is in direct contrast with the Chi and Van Lehn model. For example, in ornithology the relationships between different features of the bird play a minimal role in gaining categorization expertise versus knowing particular descriptive details of the surface features themselves.

Deeper initial learning between experts and novices (BD)
The researchers conduct various experiment on understanding Physics and Chess to show the differences between experts and novices. While a novice looking at a chess board would see the important pieces like King and Queen and maybe few nearby pieces, experts on the other hand could observe abstract attack options among those pieces [182]. Similarly, in a balancing problem, younger students might consider weight whereas older experts would consider distance along with the weight.

Disparate rates of transfer and transfer learning in AI (CO)
I found it interesting that the concept of transfer learning in the field of deep learning mirrors many of the papers discussed thus far relating experts and novices. When performing transfer learning, say on a computer vision deep learning network, one takes a model that has been trained to record many first order features that are useful for general computer vision. This base network is then taken and trained additionally on how to relate these first order features to perform the desired task, in much the same way that human experts approach a task.

Problem of Attention: Feature Extraction in the Prescence of Distractors (CV)
They base some of their formulation on the assumption that novices can extract relevant superficial cues in a nearly identical manner to experts, and support this by citing study 8 of Chi, Glaser, and Rees (1982) (Pg. 181). However, they do not discuss the extraction of features in the presence of distractor features. What happens if there is extra information in the problem which is not relevant to the solution?

The Lack of Deep Initial Learning Stifles Further Education (ES)
the lacking-deep-initial learning hypothesis describes the "discrepancy in the failure of transfer in the context of the two-problem transfer paradigm compared to the success of transfer in other tasks such as categorization." This is better stated by Ross (1987) in that "novices … do not have a good understanding of the appropriate problem structure … [and] may rely on superficial similarities of the problems to decide how to set up the correspondences between problems."

Curiosity predicting transfer (JR)
What most greatly affects my ability to learn something is having a curiosity about the subject. This is confirmed by the work of Lamnina and Chase who showed the middle schoolers experience greater transfer when information on how to solve a given problem was initially withheld.