



DESIGN BASIS FOR THE **EMOJI CHAIR** SERIES

The Problem

A poorly designed product can potentially impair cognitive functioning by creating unnecessary cognitive load on the user.

What is Cognitive Load and Why Does it Matter?

Cognitive load refers to the amount of mental effort (ie caloric/energy expenditure) required to use a product or complete a task. If a product has a high cognitive load, it can lead to cognitive overload, which can impair cognitive functioning. Excessive cognitive load is, metaphorically, an “excise tax” levied against the user for using a poorly designed product. For example, if an electronic product has too many buttons, controls, or options, it can be overwhelming for the user and make it difficult for them to perform even simple tasks. Similarly, if the product’s visual design is confusing, distracting or difficult to navigate, it too can cause frustration and cognitive fatigue. On the other hand, well-designed products can actually enhance cognitive functioning by reducing cognitive load and making it easier for the user to complete tasks. Overall, product design can have a significant impact on cognitive functioning, and it is important for designers to consider cognitive load and usability when creating new products.

The Paragon Resolution of the Cognitive Load Problem

Furniture should not compete for the limited cognitive processing resources of the people who use our products. Conversely, furniture should conserve calories/energy required for focus, physical activity and social/emotional engagement within the context of an educational environment.

Emoji Chair Design Intentions

1 Aesthetic Intent

The aesthetic design intent for the Emoji chair is to reduce the occurrence of excessive cognitive load on the user by considering the appearance of the chair frame and shell; specifically, the size, shape and accessorial features. It is important to note: the chair aesthetic must be appropriate for the age of its user, or we risk unnecessarily "taxing" the energy reserves the student needs for learning. There is some evidence to suggest that young children may have a preference for organic designs. For example, research has found that infants as young as 3 months old show a preference for curved lines over angular lines, which suggests that they may find organic shapes more visually appealing. Additionally, studies on child development have found that young children tend to have an easier time recognizing and categorizing objects that have naturalistic or organic features, such as animals or plants, compared to abstract or geometric shapes.

Child Brain Development Stages

Preoperational Stage (Ages 2 to 7)

Emoji Chair Shells B and C. Frame Sizes 12 and 14.

Cognitive growth is still happening very fast during this stage. By the age of 5, a child's brain will be 90% of the size of an adult's.

Children will usually learn how to communicate in whatever language they will primarily speak during this critical developmental phase. It's the best time to teach them multiple languages because it's easier for a child to learn.

A child will also learn how to think symbolically during the preoperational stage. The ability to focus, short-term memory, long-term memory, logic, and reasoning are all developing during these years.

- **B shell design:** medium overall size format, relaxed angular shape, loose cluster perforation "hollows," oval obround handle.
- **C shell design:** small overall size format, curvilinear shape, minimal perforation "hollows," embossed "smile" on chair back, (2) "eye hole" handle.



Concrete Operational Stage (Ages 7 to 11)

Emoji Chair Shell B. Frame Sizes 14 and 16.

Children are more aware of other people's feelings during this stage. They learn to apply logical thought to objects. The neural connections for abstract thinking are not developed during this stage.

- **B shell design:** medium overall size format, relaxed angular shape, loose cluster perforation "hollows."



Formal Operational Stage (Ages 11 to adulthood)

Emoji Chair Shell A. Frame Size 18.

The brain isn't fully developed until it is about 25 years old. Thinking becomes much more sophisticated after age 11 as the experiences a child has strengthen the synapses developed early on. During this stage, a child learns how to think abstractly. They hone their problem-solving skills and the type of person they're going to become is made clear.

- **A shell design:** large overall size format, highly geometric shape, dense cluster perforation "hollows," oval handle.



Aesthetic Design Intent Conclusion

The appearance of a product must be appropriate for the brain developmental stage of the student, or the product will impose an unnecessary caloric expenditure. The "cost" of this design error is lower cognitive functioning due to depleted energy reserves.

2 Structural and Service Intent

The structural and service design intent for the Emoji chair is to reduce the occurrence of excessive cognitive load on the user through proper physical properties of the chair frame and shell (aka physical ergonomics). Products devoid of positive ergonomics unnecessarily "taxes" the energy reserves a user requires for higher order cognitive tasks such as focus, pattern recognition, computation, and reasoning.

The Emoji chair shell materials and perforated design work in concert to reduce the user's thermogenic activity level. Body temperature regulation is controlled by the autonomic nervous system (ANS) and it requires calories/energy expenditure. The human brain is highly sensitive to changes in body temperature, and even small variations from the normal range can affect cognitive performance, including decreased attention, impaired working memory and fatigue. When body temperature is too high (a condition called hyperthermia), cognitive function can be severely impaired. Emoji chair shells assist in maintaining body temperature regulation through:

Material Choice: The materials used in furniture can affect how much body heat is retained or released. For example, a standard hard plastic chair shell can trap heat and make someone feel warmer, whereas a lighter, polypropylene perforated shell design will allow for better airflow and cooling.

Material Design: Perforated shell design allows for air flow over a greater surface area of the user's body. Air flow allows heat to escape the user which, in a properly controlled environment, results in less work for the ANS to regulate temperature variations.

