DAILY ASSESSMENT FORMAT

Date:	2nd July2020	**Name:**	Soundarya NA
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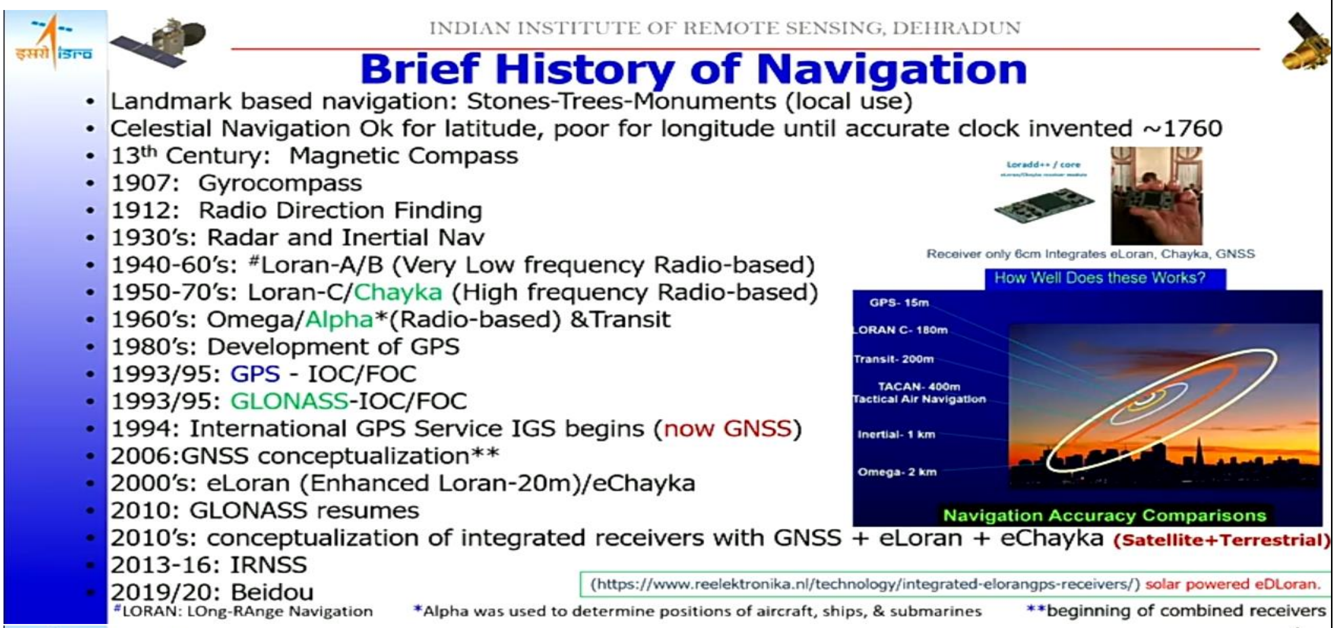
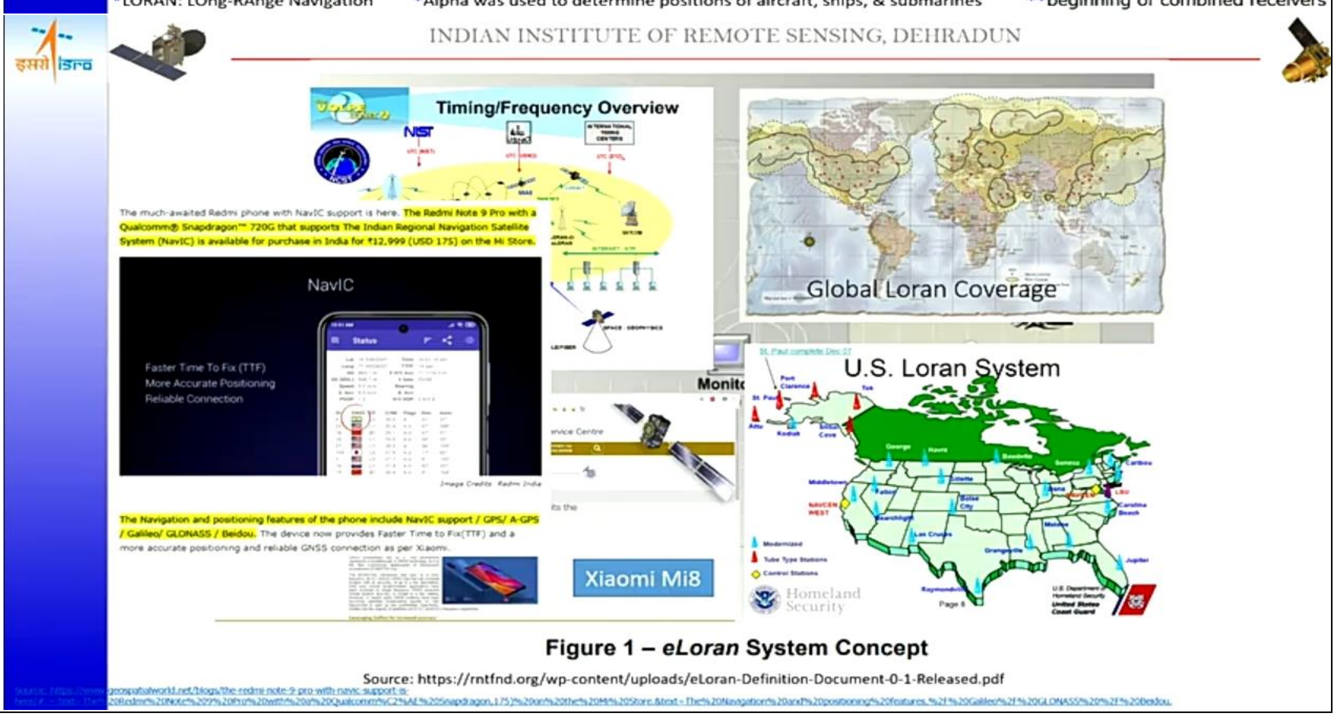
FORENOON SESSION DETAILS

Image of session





Report:

The ability to replicate an experiment across any scientific discipline rests on the assumption that different experimenters are capable of perceiving the same methods and outcomes. However, the large individual differences in experimenters' visual perception undermine this tenet of the scientific process. Further, common devices for measuring similarity in perceptual capacity do not replicate across human groups. Here, we used evolved navigation theory to predict a universal way to measure human perceptual capacity via a distance illusion. We then compared this descent illusion across groups that we selected specifically for their extreme differences: adults in the United States and a group of indigenous Ixil Maya in Guatemala. The descent illusion was indistinguishable across samples. This illusion is among a growing group of evolved illusions capable of comparing subjective human perception across individuals.

Environmental perception is prerequisite to most vertebrate behavior and its modern investigation initiated the founding of experimental psychology. Navigation costs may affect environmental perception, such as overestimating distances while encumbered (Solomon, 1949). However, little is known about how this occurs in real-world navigation or how it may have evolved. We manipulated the most commonly navigated surfaces with a non-intuitive cost derived from evolved navigation theory. Observers in realistic settings unknowingly overestimated horizontal distances that contained a risk of falling and did so by the relative degree of falling risk. This manipulation produced previously unknown, large magnitude illusions in everyday vision in the environments most commonly navigated by humans. These results bear upon predictions from multiple fundamental theories of visual cognition.

Most people anecdotally feel that the distance extending toward a cliff or slope appears shorter than the same distance extending away from it. This odd impression persists, despite the distance being equal across both conditions and humans encountering such a scenario daily in the navigation of stairs, slopes, curbs, and vertical surfaces protected by handrails. We tested three sets of competing predictions about this previously uninvestigated phenomenon. Data from two experiments coincided with the well-established predictions from evolved navigation theory. Contrary to anecdotal expectations, observers perceive the distance extending toward the edge of a steep slope to be longer than the distance extending away from it. We title this the plateau illusion and suggest that it may be an embodied process that arose over evolutionary time in response to navigation risks.

In order to make this conclusion, one assumes that the grip aperture is based on a visual estimate of the object's size. We believe that it is not, and that this is why size illusions fail to influence grip aperture. Illusions generally do not affect all aspects of space perception in a consistent way, but mainly affect the perception of specific spatial attributes. This applies not only to object size, but also to other spatial attributes such as position, orientation, displacement, speed, and direction of motion. Whether an illusion influences the execution of a task will therefore depend on which spatial attributes are used rather than on whether the task is perceptual or motor. To evaluate whether illusions affect actions when they influence the relevant spatial attributes we review experimental results on various tasks with inconsistent spatial processing in mind. Doing so shows that many actions are susceptible to visual illusions. We argue that the frequently reported differential effect of illusions on perceptual judgements and goal-directed action is caused by failures to ensure that the same spatial attributes are used in the two tasks. Illusions only affect those aspects of a task that are based on the spatial attributes that are affected by the illusion.

An adaptation theory of visual space is developed and applied to the data of a variety of studies of visual space perception. By distinguishing between the perceived distance of an object and that of the background or sky, the theory resolves the paradox of the moon illusions and relates both perceived size and perceived distance of the moon to the absolute level of spatial adaptation. The theory assumes that visual space expands or contracts in adjustment to changes in the sensory indicators of depth and provides a measure, A, of this adaptation-level. Changes in A have two effects--one on perceived size, one on perceived distance. Since A varies systematically as a function of angle of regard, availability of cues, and the total space-value, A is a measure of the moon illusions, and a practical index of individual differences by pilots and astronauts in the perception of the size and distance of objects on the ground and in the air.

Modification of Restle's theory (1970) explains the moon illusion and related phenomena on the basis of three principles: (1) The apparent sizes of objects are their perceived visual angles. The apparent size of the moon is determined by the ratio of the angular extent of the moon relative to the extents subtended by objects composing the surrounding context, such as the sky and things on the ground. The visual extents subtended by common objects of a constant physical size decrease systematically with increasing distance from the observer. Further development of this theory requires specification of both the components of the surrounding context and their relative importance in determining the apparent size and distance of the moon.

The current study comprises the first systematic meta-analysis of weight illusions. We obtained descriptive data from studies in which subjective heaviness estimates were made for pairs or groups of objects that had the same mass and different volumes (size-weight illusion; SWI) or different apparent material properties (material-weight illusion; MWI). Using these data, we calculated mean effect sizes to represent illusion strength. Other study details, including stimulus mass, volume, density, and degree of visual and somatosensory access to the stimuli were also recorded to quantify the contribution of these variables to effect sizes for the SWI. The results indicate that the SWI has a larger mean effect size than the MWI and that the former is consistent in strength when information about stimulus size is gained through somatosensory channels, regardless of visual access. The SWI is weaker when only the visual system provides size information. Effect sizes for the SWI were larger when there was a greater difference in volume across the stimuli. There was also a positive correlation between SWI strength and the difference in physical density across the different experimental stimuli, even after controlling for volume differences. Together, we argue that these findings provide support for theories of weight illusions that are based on conceptual expectancies as well as those that are based on bottom-up processing of physical density. We further propose that these processes, which have been considered dichotomously in the past, may not be mutually exclusive from each other and could both contribute to our perception of weight when we handle objects in everyday life.

In the size-weight illusion (SWI), a small object feels heavier than an equally-weighted larger object. It is thought that this illusion is a consequence of the way that we internally represent objects' properties--lifters expect one object to outweigh the other, and the subsequent illusion reflects a contrast with their expectations. Similar internal representations are also thought to guide the application of fingertip forces when we grip and lift objects. To determine the nature of the representations underpinning how we lift objects and perceive their weights, we examined weight judgments in addition to the dynamics and magnitudes of the fingertip forces when individuals lifted small and large exemplars of metal and polystyrene cubes, all of which had been adjusted to have exactly the same mass. Prior to starting the experiment, subjects expected the density of the metal cubes to be higher than that of the polystyrene cubes. Their illusions, however, did not reflect their conscious expectations of heaviness; instead subjects experienced a SWI of the same magnitude regardless of the cubes' material. Nevertheless, they did report that the polystyrene cubes felt heavier than the metal ones (i.e. they experienced a material-weight illusion). Subjects persisted in lifting the large metal cube with more force than the small metal cube, but lifted the large polystyrene cube with roughly the same amount of force that they used to lift the small polystyrene cube. These findings suggest that our perceptual and sensorimotor representations are not only functionally independent from one another, but that the perceptual system represents a more single, simple size-weight relationship which appears to drive the SWI itself.

Background: Our expectations of an object's heaviness not only drive our fingertip forces, but also our perception of heaviness. This effect is highlighted by the classic size-weight illusion (SWI), where different-sized objects of identical mass feel different weights. Here, we examined whether these expectations are sufficient to induce the SWI in a single wooden cube when lifted without visual feedback, by varying the size of the object seen prior to the lift.

Methodology/principal findings: Participants, who believed that they were lifting the same object that they had just seen, reported that the weight of the single, standard-sized cube that they lifted on every trial varied as a function of the size of object they had just seen. Seeing the small object before the lift made the cube feel heavier than it did after seeing the large object. These expectations also affected the fingertip forces that were used to lift the object when vision was not permitted. The expectation-driven errors made in early trials were not corrected with repeated lifting, and participants failed to adapt their grip and load forces from the expected weight to the object's actual mass in the same way that they could when lifting with vision.

Conclusions/significance: Vision appears to be crucial for the detection, and subsequent correction, of the ostensibly non-visual grip and load force errors that are a common feature of this type of object interaction. Expectations of heaviness are not only powerful enough to alter the perception of a single object's weight, but also continually drive the forces we use to lift the object when vision is unavailable.