A possible cognitive risk of using mobile phones during driving

Toward filling the gap between ergonomics and neuroscience

For elucidating a cognitive risk of using mobile phones during driving, we carried out experiments based on a dichotomy of the human visual system: The dorsal subsystem for dealing with 'where' aspect (locations) of visual information and the ventral for 'what' aspect (colors, shapes). Driving in a situation was assumed to use either of the subsystems depending on the aspect of visual information required for the situation. Hearing through a mobile phone in a situation was also assumed to use either of the subsystems for mentally imaging each of the aspects. Subjects in the experiments concurrently carried out visual and auditory tasks; They differentially responded to either location or color in the visual task and their reaction times were measured, while they mentally imaged either location or color in the auditory task. Reaction times were longer when the aspect in the concurrent auditory task was the same as that in the visual task than when different.

Takashi Hamada
Institute for Human Science and Biomedical Engineering
hamada-takashi@aist.go.jp

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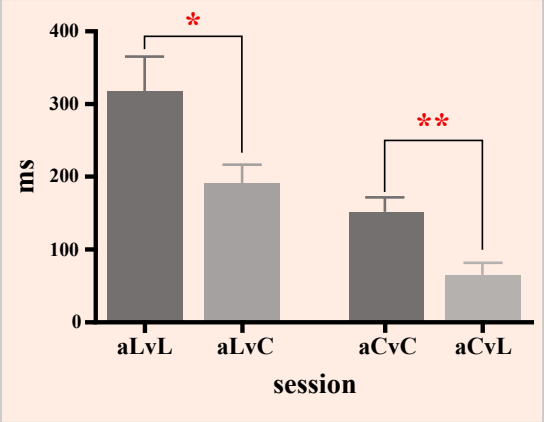

Reaction times (RTs) in the visual tasks were increased due to the concurrent auditory tasks.
The figure shows the increased amount in RTs with respect to the aspects of the visual and auditory tasks.
a: auditory, v: visual, L : location, C: color
*: $p < 0.05$, **: $p < 0.01$.
(p shows the percentage of risk in statistical testing of significant difference)

Autoilluminated fluorescent protein for greater sophistication in cell imaging

GFP fluoresces without exposure to external excitation light

We have developed a technology for exciting Green Fluorescent Proteins (GFP) by using the bioluminescence reaction, and a new imaging technique using this new enhancing technology.

Usually, an external light source was needed to yield the fluorescence of GFP in its various applications. On the other hand, luminous marine organisms such as sea pansy, *Renilla reniformis* can induce GFP fluorescence via luciferin-luciferase reaction. The phenomenon is well-known as bioluminescence resonance energy transfer (BRET). Using the BRET, we have combined GFP variants with *Renilla* luciferase to produce autoilluminated GFPs. If the luciferin called "Coelenterazine" is present, no external light source is required to excite GFPs. Different types of GFPs will emit light of different colors. We have used this technology to develop a new bioluminescence imaging probe that permits the observation of a single cell.

Hideto Hoshino
Research Institute for Cell Engineering
ah-hoshino@aist.go.jp

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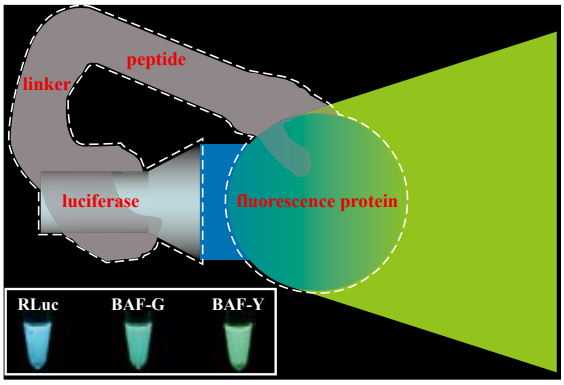

Conceptual diagram of BRET-based Autoilluminated Fluorescent-protein (BAF)
BAF is an artificial protein made by combining fluorescent protein and luciferase with linker peptide (dotted line). Fluorescent protein is made to glow by the luciferin-luciferase reaction (RLuc : blue luminescence of *Renilla reniformis* luciferase (left of photo), BAF-G : green luminescence of the newly developed BRET-based Autoilluminated Fluorescent-protein (center of photo), BAF-Y : yellowish-green luminescence of the newly developed BRET-based Autoilluminated Fluorescent-protein (right of photo).