# The effects of anatomical information and observer expertise on abnormality detection task



| | |
|---|---|
| Titre | The effects of anatomical information and observer expertise on abnormality detection task |
| Type de publication | Communication |
| Type | Communication avec actes dans un congrès |
| Année | 2011 |
| Langue | Anglais |
| Date du colloque | 2011 |
| Titre du colloque | SPIE Medical Imaging |
| Titre des actes ou de la revue | Proceedings of the 2011 SPIE Medical Imaging |
| Volume | 7966 |
| Pagination | 79661G - 79661G-8 |
| Auteur | Zhang, Lu [1], Cavaro-Ménard, Christine [2], Le Callet, Patrick [3], Cooper, L.-H.-K. [4], Hunault, Gilles [5], Tanguy, Jean-Yves [6] |
| Pays | Etats-Unis |
| Ville | Orlando |
| Mots-clés | anatomical information [7], HVS [8], image perception [9], MRI [10], multiple sclerosis [11], observer performance [12], psychometric function [13], visibility threshold [14] |

| | |
|---|---|
| Résumé en anglais | This paper presents a novel study investigating the influences of Magnetic Resonance (MR) image anatomical information and observer expertise on an abnormality detection task. MRI is exquisitely sensitive for detecting brain abnormalities, particularly in the evaluation of white matter diseases, e.g. multiple sclerosis (MS). For this reason, MS lesions are simulated as the target stimuli for detection in the present study. Two different image backgrounds are used in the following experiments: a) homogeneous region of white matter tissue, and b) one slice of a healthy brain MR image. One expert radiologist (more than 10 years' experience), three radiologists (less than 5 years' experience) and eight naÃ¯ve observers (without any prior medical knowledge) have performed these experiments, during which they have been asked different questions dependent upon level of experience; the three radiologists and eight naÃ¯ve observers were asked if they were aware of any hyper-signal, likely to represent an MS lesion, while the most experienced consultant was asked if a clinically significant sign was present. With the percentages of response "yes" displayed on the y-axis and the lesion intensity contrasts on the x-axis, psychometric function is generated from the observer' responses. Results of psychometric functions and calculated thresholds indicate that radiologists have better hyper-signal detection ability than naÃ¯ve observers, which is intuitively shown by the lower simple visibility thresholds of radiologists. However, when radiologists perform a task with clinical implications, e.g. to detect a clinically significant sign, their detection thresholds are elevated. Moreover, the study indicates that for the radiologists, the simple visibility thresholds remain the same with and without the anatomical information, which reduces the threshold for the clinically significant sign detection task. Findings provide further insight into human visual system processing for this specific task, and this study provides the foundation for a series of studies investigating numerical observer modeling to be designed, with the ultimate aim of investigating the medical image quality assessment approach by addressing the perspective of radiologist diagnostic performance. |
| Notes | Date du colloque : 02/2011 |
| URL de la notice | http://okina.univ-angers.fr/publications/ua1704 [15] |
| DOI | 10.1117/12.877590 [16] |
| Lien vers le document en ligne | http://dx.doi.org/10.1117/12.877590 [16] |

---

**Liens**

[1] http://okina.univ-angers.fr/publications?f[author]=2207
[2] http://okina.univ-angers.fr/c.menard/publications
[3] http://okina.univ-angers.fr/publications?f[author]=2252
[4] http://okina.univ-angers.fr/publications?f[author]=2356
[5] http://okina.univ-angers.fr/gilles.hunault/publications
[6] http://okina.univ-angers.fr/publications?f[author]=2251
[7] http://okina.univ-angers.fr/publications?f[keyword]=6472
[8] http://okina.univ-angers.fr/publications?f[keyword]=4258
[9] http://okina.univ-angers.fr/publications?f[keyword]=6473
[10] http://okina.univ-angers.fr/publications?f[keyword]=1393
[11] http://okina.univ-angers.fr/publications?f[keyword]=6474
[12] http://okina.univ-angers.fr/publications?f[keyword]=6475
[13] http://okina.univ-angers.fr/publications?f[keyword]=6476
[14] http://okina.univ-angers.fr/publications?f[keyword]=6477

[15] http://okina.univ-angers.fr/publications/ua1704
[16] http://dx.doi.org/10.1117/12.877590