The „Attention Window“:
An overview of a new attention task
and different research findings

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- Research associate at the Institute of Cognitive and Team/Racket Sport Research (German Sport University Cologne)

- Doctoral dissertation 2014 (“The ‘Attention Window’ Model: An exploration of different influential factors on the size and shape of the visual focus of attention in sports”)

- Research interests: visual attention, motivation, creativity
Visual attention in sports

- Real-life situations require to focus attention on two locations simultaneously
- Optimal alignment and flexible adjustment of the focus of attention as an essential condition for successful performances
Visual attention

Attention Window

Definition

- Largest stimulus separation at which each subject reliably identifies two stimuli on at least 75% accuracy
Attention Window Task

Hüttermann, Memmert, Simons & Bock (2013) PLoS ONE
Attention Window Task

Hüttermann et al (2013) *PLoS ONE*
Aim of the research program

Experimentally not influenceable factors

- Personal abilities:
  - Age
  - Gender

- Personal development:
  - Sport experience

Focus of Attention

- Size?
- Shape?

Performance?

Experimentally influenceable factors

- Changes in tasks:
  - Gaze behavior

- Changes in situations:
  - Physical pressure
  - Motivation
  - Mood
  - Subliminal information processing
How do experimentally not influenceable factors affect the size and shape of the visual focus of attention?

Experimentally not influenceable factors:
- age
- gender
- sports experience
Maximum Attention-Window: Younger versus older people

**Younger people**

\(M_{\text{Age}} = 23\text{ years} \pm 2\text{ years}\)

AW: 31,48° ± 3,32°

**Older people**

\(M_{\text{Age}} = 69\text{ years} \pm 5\text{ years}\)

AW: 23,06° ± 3,38°

Gender:

\(F(1,22) = 3.021, \ p = .096\)

Group:

\(F(1,22) = 37.775, \ p < .001, \ \eta^2 = .632\)

Meridian:

\(F(2,44) = 3.487, \ p = .039, \ \eta^2 = .137\)

Hüttermann, Bock & Memmert (2012) *Ageing Research*
Maximum Attention Window: Athletes versus non-athletes

**Athletes**
AW: 37.04°±5.36°

**Non-athletes**
AW: 29.67°±8.26°

Gender:
\( F(1,35)=0.797, \, p=.378 \)

Group:
\( F(1,35)=10.717, \, p=.002, \, \eta_p^2=.234 \)

Meridian:
\( F(2,70)=29.162, \, p<.001, \, \eta_p^2=.455 \)

Answer to the 2nd research question

To what extent do experimentally influenceable factors change the size and shape of the visual focus of attention?

**Experimentally suggestible factors:**
- Changes in tasks
  - Gaze behavior
- Changes in situations
  - Physical exercise
  - Motivation
  - Mood
Changes in Situation: Physical Exercise

- **Low Physical Exercise:**
  50% of the individual max. heart rate

- **Moderate Physical Exercise:**
  60% of the individual max. heart rate

- **High Physical Exercise:**
  70% of the individual max. heart rate
Changes in Situation: Physical Exercise

**Low Physical Exercise**
- **Athletes:** 70.07% ± 4.91%
- **Non-athletes:** 59.50% ± 6.32%

**Moderate Physical Exercise**
- **Athletes:** 73.52% ± 4.59%
- **Non-athletes:** 63.26% ± 11.10%

**High Physical Exercise**
- **Athletes:** 77.79% ± 3.33%
- **Non-athletes:** 58.90% ± 6.62%

Expertise: \( F(1,15) = 23.009, p < .001, \eta_p^2 = .605 \)
Physical Exercise: \( F(2,30) = 3.643, p = .038, \eta_p^2 = .195 \)
Interaction (Expertise x Physical exercise):
\( F(2,30) = 5.107, p = .012, \eta_p^2 = .254 \)

Hüttermann & Memmert (2014) *Physiology & Behavior*
Changes in Situation: Motivational Status

Regulatory Focus Theory

induced promotion focus

induced prevention focus

Förster, Friedman, Özelsel & Denzler (2006) *Journal of Experimental Social Psychology*
Changes in Situation: Motivational Status

**Promotion focus**
- 5°-20°: 81,07%±2,21%
- >20°-40°: 77,14%±3,80%

**Prevention focus**
- 5°-20°: 87,38%±3,90%
- >20°-40°: 69,88%±6,76%

Group:
- $F(1,18)=0.122, \ p=.731$

Meridian:
- $F(2,36)=19.277, \ p=.001, \ \eta^2_p=.517$

Interaction (Focus x visual angle between two stimuli):
- $F(1,18)=21.493, \ p<.001, \ \eta^2_p=.544$

Hüttermann & Memmert (2014) *Cognition and Emotion*
Changes in Situation: Mood

Positive mood
before: 32.50°±13.91°
after: 39.50°±11.29°
t(7)=1.428, p=.196

Negative mood
before: 30.67°±10.52°
after: 19.50°±6.53°
t(7)=3.680, p=.008

Mood: \(F(1,14)=5.587, p=.033, \eta_p^2=.285\)
Interaction (time of measurement x mood): \(F(1,14)=9.925, p=.007, \eta_p^2=.415\)

Hüttermann & Memmert (2014) *Cognition & Emotion*
Answer to the 3rd research question

Which effects does the direction of the attention focus have on general performances and what does this mean for sports?
Offside decision-making in soccer

angle < 35°: 72% correct decisions

angle > 35°: 42% correct decision

N = 111, $B = 0.030$, $SE = .011$, $p = .006$, 95% CI = 1.009-1.052; constant: $B = -1.228$, $SE = .440$, $p = .005$

Hüttermann, Noël, Simons, & Memmert (in preparation)
The Attention Window Model

Experimentally not influenceable factors

- Personal abilities:
  - age
  - Gender

- Personal development:
  - sport experience

Experimentally influenceable factors

- Changes in tasks:
  - gaze behavior

- Changes in situations:
  - Physical pressure
  - Motivation
  - mood
  - subliminal information processing

Performance
Summary of the study results

- Average maximum focus size: 29° (experts/athletes: 35°)

- Size influenceable by age and expertise (but not by gender), as well as by changes in tasks and situations

- Elliptical form of the focus, irrespective of influencing factors: average orientation: 32° horizontal, 29° diagonal, 27° vertical

- Visual field is about five/six times as great as our maximum focus of attention
Outlook/sport-practical implications

- Tasks/situations should be adapted to personal abilities and developments of the respective person/group (e.g. through age-specific programs of training contents, that correspond to the expertise-level of a group)

- Consideration of the use of technical devices/personal additions (e.g. in order to improve the decision-making of referees)
Outlook

Examination whether a larger Attention-Window ...

- is the cause of a learning process
- or rather training process
End.

Thank you for your attention!
Publications resulting from the research program


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