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Center for Language and Cognition Groningen

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The PAT Project: Annotation and Evaluation of Pictures and Text



Ielka van der Sluis
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November 2018, Göteborg

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3. Testing Design Features
4. Future Work
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PAT Goals

Identify and evaluate effective design features in multimodal instructions (MIs)

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PAT: Pictures and Text

In the PAT project we systematically investigate picture-text combinations in multimodal instructions (MIs).

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PAT Scope

- > Design, usability and optimisation of instructions that contain pictures and text
- > Approaches from Information Design Research and Computational Linguistics
- > Corpus collection, computer-assisted annotation, experimentation
- > Long term goals: (semi-)automatic annotation, evaluation and generation of instructions

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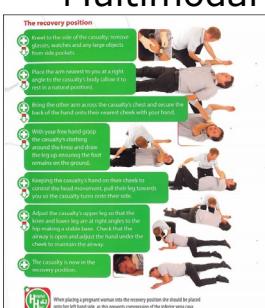
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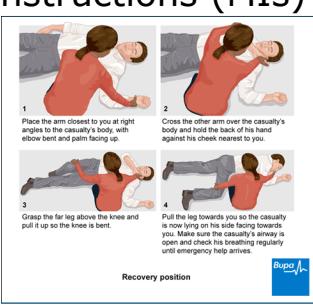
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Multimodal Instructions (MIs)



The recovery position
 1. Roll the side of the casualty's torso.
 2. Place the arm closest to you at right angles to the casualty's body, with elbow bent and palm facing up.
 3. Place the other arm across the casualty's chest and secure it by placing your hand over the top of the casualty's hand.
 4. Bend the casualty's knee so that it is bent and tucked towards the casualty's chest.
 5. Grasp the far leg above the knee and pull it up so the knee is bent.
 6. Turn the casualty's nose to the side.
 7. Place the far leg across the casualty's body, with knee bent and foot flat against the floor.
 8. Turn the casualty's head to the side.
 9. Check the casualty's breathing and pulse every few minutes.
 10. If the casualty is unconscious, call for medical help.

Recovery position



1. Place the arm closest to you at right angles to the casualty's body, with elbow bent and palm facing up.
 2. Cross the other arm over the casualty's body and hold the back of his hand against his cheek nearest to you.
 3. Grasp the far leg above the knee and pull it up so the knee is bent.
 4. Pull the leg towards you so the casualty is now lying on his side facing towards you. Make sure the casualty's airway is open and check his breathing regularly until emergency help arrives.

Recovery position

<https://www.train-aid.co.uk/>

<https://losangelesepilepsysociety.files.wordpress.com/>

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Define MI

CPR IS AS EASY AS C-A-B

Circular ACLS Algorithm

Shout for Help/Activate Emergency Response

Start CPR
• Give oxygen
• Abdominal resuscitation

2 minutes

If VF/VT
• Shock
• Drugs
• Consider Advanced Airway
• Treat Reversible Causes
• Monitor CPR Quality

Return of Spontaneous Circulation (ROSC)

Post-CPR
• Continuous CPR
• Consider Advanced Airway
• Quantitative waveform capnography
• Treat Reversible Causes
• Monitor CPR Quality

Herviering
Reanimatie

• Controller bewustzijn
• Controller ademhaling
• Bel direct 1v+2
• Start direct met 30 borstcompressies
• Biedt keer
• Als de AED er is

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Effective Combination?

Vervrijden van een been

Wanneer je een been zo snel mogelijk. Het is niet nodig om alcohol, jodium, die of andere middelen te gebruiken voordat u een been verwijderd. Dit heeft geen effect op het verwijderen.

• Neem een puntig voorwerp en de hand goed bij de huid en verplaats het met de huid van de been. Let hierbij op dat de huid niet beschadigd wordt. De hand moet goed zijn om de huid te dragen of symmetrisch. Los altijd de verpakking van het product goed door.

• Maak de huid droog en reinig de huid goed. Druk de huid niet te hard tegen de huid. Druk de huid niet te hard tegen de huid. Druk de huid niet te hard tegen de huid. Druk de huid niet te hard tegen de huid.

• Gebruik een borstel om de huid te reinigen. Druk de huid niet te hard tegen de huid.

• Noteer de datum waarop u de huid heeft verwijderd en geplaatst in uw agenda.

Instructie over de reis naar het werk in het groen

Trek vervrijden

Als u een trein of bus gebruikt is het de bestek dat je komt te ontdekken wanneer u weer thuis bent. Wanneer u een trein of bus gebruikt is het de bestek dat je komt te ontdekken wanneer u weer thuis bent. Wanneer u een trein of bus gebruikt is het de bestek dat je komt te ontdekken wanneer u weer thuis bent. Wanneer u een trein of bus gebruikt is het de bestek dat je komt te ontdekken wanneer u weer thuis bent.

• Plaats de hand op de huid en probeert hem te verwijderen. Wanneer u een trein of bus gebruikt is het de bestek dat je komt te ontdekken wanneer u weer thuis bent. Wanneer u een trein of bus gebruikt is het de bestek dat je komt te ontdekken wanneer u weer thuis bent.

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• Trek de hand uit de huid en neem de hand weg. Wanneer u een trein of bus gebruikt is het de bestek dat je komt te ontdekken wanneer u weer thuis bent. Wanneer u een trein of bus gebruikt is het de bestek dat je komt te ontdekken wanneer u weer thuis bent.

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f.t.t.r.: GGD reisvakanties, Waterschappen, NN, NN, Centrale Huisartsendienst Drenthe, Service Apotheek.

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Multimodal Content

- > Various models describe human processing e.g., Schnottz et al. (2017); Sweller (2016); Mayer, 2005; Schnottz (2005)
- > Numerous empirical studies present positive effects of pictorial content e.g., Van Hooijdonk & Krahmer (2008); Houts et al. (2006); Katz et al. (2006); Maes et al. (2004)
- > No standard methodology to describe and evaluate text-picture relations in documents for situated use cf. Mann & Thompson (1988); Bateman (2014)

Van der Sluis, I., Leito, S. & Redeker, G. (2016)

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Starting Points

- > Much variability in the design of multimodal instructions
- > No authoring guidelines
- > Very few user studies (mostly reader judgements)

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Multimodality

- > Improves clarity

Wat te doen bij een telefoontje?
Vervolgd de tekst noch: binnen 10 min. aan op de juiste manier. De kans om bewerking is dan wel heel groot. Neem een grote waarde om de hand goed kan variëren, maar vooral een paar grote stappen. Bij de druk of openbaar zijn ook speciale producten beschikbaar.

- Pak de teek zo dicht mogelijk bij de hand vast en trek hem voorzichtig uit de huid. Druk de teek heel hard niet plat. Een achterhoofd sluike van de mondelinge teek kan gaan en te vallen.
- Omsluit het wond met 70% alcohol, jodium of zalf.
- Noteer de datum in uw agenda en let na 1 maanden na de los op ziekenhuisrichtlijnen, voorbeeld gezondheid klachten en een ergernis bestrijding vindt plaats.

Bernsen, 1994; Kjeldahl, 1992; Mayer, 2009; Schriver, 1997; Black et al., 2017

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Method

Analyse MI designs

- Collect corpus
- Develop annotation model for text, pictures and picture-text relations

Evaluate MI designs

- Develop evaluation method:
 - Readers, users
 - Measurements
 - Context

Slide 7

GR88 deze komt hier te laat

Gisela Redeker; 14-11-2018

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Corpus Analysis

Research questions:

- > How can we describe pictures, text and the relations between them?
- > In which ways do designers combine pictures and text in MI documents and videos?

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Target audience

(Lentz & Pander Maat, 2004)



PRODUCT CARE:

- 1. Hand wash, cold
DO NOT BLEACH
- 2. Line dry, sun dry
DO NOT WASH
- 3. Iron low temperature
DO NOT DRY CLEAN
- 4. Do not fabric softener

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Research Questions

- > **Smart OCR:** How can MI segments (e.g., text segments, icons, pictures) be recognised automatically?
- > **Document structure:** Which elements should be distinguished?
- > **Design:** Which textual and pictorial characteristics are important and how are text-picture relations realised?
- > **Effectiveness:** Which design factors facilitate processing and execution of the instruction?

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Learning, doing, deciding

(Van Hooijdonk & Spooren, 2011; Maes et al., 1996; Arts et al., 2011)



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PAT Corpus Development

- > **Collectors/Annotators**
 - MA students in Communication and Information Sciences at RuG
- > **MI corpus**
 - Currently about 300 first-aid MIs. Will be expanded each year. This year 96 new MIs
- > **Annotation**
 - 51 categories for text, pictures and their relations

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Corpus Overview

Topic	Frequency
Breathing disorders	61
Bone fractures and dislocations	45
Consciousness disorders and breathing disorders	40
Wounds	40
Other injuries and diseases	33
Hemorrhage	22
Removal of victim from a dangerous situation	21
Life threatening injuries and diseases	14
Eye injuries	8
Consciousness disorders	8
General first-aid	4
Nose and ear injuries	4
Possible vertebra injuries	3
Denture injuries	3
Contamination	1

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PAT Workbench

- Online tool to systematically investigate multimodal document design.
- Current focus: Multimodal Instructions (MIs) in the first-aid domain.
- PAT offers 'smart' OCR, storage, search- and selection and facilitates storage, annotation, retrieval and evaluation of MI.

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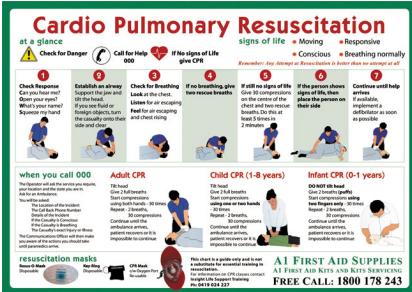
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Warning, explanation, advice

(Steehouder & Jansen, 1997; Maes et al., 1996)

Cardio Pulmonary Resuscitation



Warning, explanation, advice

(Steehouder & Jansen, 1997; Maes et al., 1996)

Cardio Pulmonary Resuscitation

at a glance

Check for Danger: Call for Help 000 If no signs of life give CPR

Give CPR: If no breathing, feel for air escaping. If no pulse breath. Give 30 compressions, then 2 breaths. Continue until help arrives or the person shows signs of life.

Signs of life: Moving, responsive, conscious, breathing normally.

Remember: Any attempt at resuscitation is better than none.

Check Response: Open your eyes, pinch nostrils, Squeeze my hand

Get help as quickly as possible: Call for help 000. If no one else is available, give CPR.

Check for breathing: Listen for air escaping. If no breathing, feel for air escaping and breathing.

If no breathing, give rescue breaths: Do 30 compressions, then 2 breaths. Continue until help arrives or the person shows signs of life.

Give 30 compressions: Tilt head back, lift chin. Give 30 compressions, then 2 breaths. Continue until help arrives or the person shows signs of life.

Give 2 breaths: Give 2 breaths. Continue until help arrives or the person shows signs of life.

Adult CPR: Give 30 compressions, then 2 breaths. Continue until help arrives or the person shows signs of life.

Child CPR (1-8 years): Give 30 compressions, then 2 breaths. Continue until help arrives or the person shows signs of life.

Infant CPR (0-1 years): Give 30 compressions, then 2 breaths. Continue until help arrives or the person shows signs of life.

DO NOT: Do not hold the head back. Do not compress the heart. Do not give mouth-to-mouth breathing. Do not give rescue breaths. Do not give chest compressions if it is impossible to breathe. Do not put any ointments, butter, or other remedies on the burn. These can make the burn worse. Do not break blisters that have formed.

A1 FIRST AID SUPPLIES
A1 FIRST AID KITS AND KITS SERVICING
FREE CALL: 1800 178 243

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Segments & Document Structure

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Name	Description
Title	The Title of a document is usually placed at the top of the document and presents information about the content of the document. The font size of a Title is usually larger than the main text. The font colour may also differ from the rest of the text in the document.
Heading	Headings precede one or more paragraphs. Headings contain information about the content or place of a paragraph within the procedure described in the document.
Paragraph	A Paragraph consists of one or more sentences and is separated from the previous paragraph or heading with a hard return or white line.
Picture	Photograph, drawing or other graphical presentation.
Caption	Captions are placed above or below a picture. Captions may contain a label and/or a description of the content of the picture.
Inset	Insets are textual a/o pictorial elements that are added to a picture (superimposed or attached). They can present an enlarged detail or additional information e.g. about duration, danger, or temperature.
Extraneous Material	Any material unrelated to the content of the multimodal instruction (e.g., page numbers, logos, pictures)

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Number of actions

(Maes et al., 1996; Steehouder & Jansen, 1997)

Burns

Scald burns from hot water and other liquids are the most common burns in early childhood. Because burns range from mild to life threatening, some can be treated at home, while others need emergency medical care.

What to Do:

If a child is severely burned, call 911 right away. While you wait for help, begin these treatments:

- Remove clothing from the burned areas, except clothing stuck to the skin.
- Run cool (**not cold**) water over the burn until the pain lessens.
- Gently apply a gauze bandage to the burn.
- If the burn is caused by a liquid, offer the person a spoonful of acetaminophen for pain.
- Do not put any ointments, butter, or other remedies on the burn.** These can make the burn worse.
- Do not break blisters that have formed.**

Negated actions

Seek Emergency Medical Care If:

- The burned area is large (cover the area with a clean, soft cloth or towel).
- The burn came from a fire, an electrical wire or socket, or chemicals.
- The burn is on the face, hands, feet, joints, or genitals.
- The burn looks infected (with swelling, pus, or increasing redness or red streaking of the skin near the wound).

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PAT Annotation

	Variable	Values
Text	Special Type Setting	Size+, Size-, Colour, Italics, Bold, Underlined, Other
	Text Organisation	Preamble, Instruction, Closing
Pictures	Content Presentation	Aid worker, Victim, Object
	Added Elements	Arrow, Logo, Line, Symbol, Text
	Perspective	Close up, Middle Shot, Long Shot
Pictures and Text	Action Type	Preparatory Action, Core Action, Closing Action
	Action Status	Obligatory Action, Alternative Action, Conditional Action
	Action Aspect	Process, Result
	Control Information	Warning, Condition, Manner, Purpose, Motivation, Advice, Explanation, Situation Sketch, Other
Picture-Text Relations	Relation Identification	Index, Alignment, Proximity
	Form Textual Reference	Number, Letter, Numeral, Unspecified, Parentheses, Other
	Content Textual Reference	Picture Part, Multiple Pictures, Imperative, Location

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Affordance or human body

(Glenberg & Robertson, 1999; Houts et al., 2006; Hoogwijk et al., 2009)

Reanimeren & defibrillieren (AED)



1. Lay the person flat on their back. 2. Turn on the AED. 3. Turn on the AED. 4. Turn on the AED. 5. Turn on the AED. 6. Turn on the AED. 7. Turn on the AED.

Rode Kruis

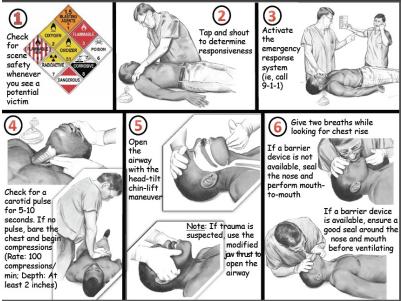
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Number of pictures

(Tversky & Morrison, 2002; Carney & Levin, 2002)

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Een teek? Pak 'm beet!

Check iedere plek!



- Neem een puntig pincet of een tektang.
- Pak de teek zo dicht mogelijk bij de huid vast en trek hem er voorzichtig uit.
- Ontsmet het wondje.
- Schrijf op waardeer en waar op het lichaam u gebeten bent.
- Binnen 3 maanden na de beet grijpachtige verschijnselen of rode kring rond de beet?
- Als een teek langer dan 24 uur in de huid heeft gezeten, overleg dan met uw huisarts of behandeling nodig is.



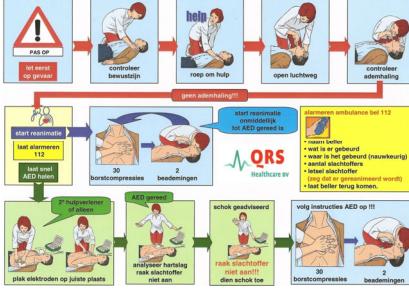
www.gddrente.nl

Controleer altijd op teken na een verblijf in de natuur of tuin. Verwijder een teek binnen 24 uur; de kans op de ziekte van Lyme is dan heel klein!

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Text and Symbols in Pictures

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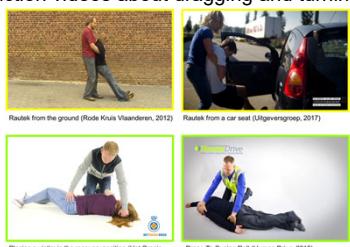


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Vijfinkel, C., Van der Sluis, I. & Redeker, R. (2018)

Analysing Videos

> How are language, image, and sound used in first-aid instruction videos about dragging and turning victims?



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Een teek? Pak 'm beet!

Check iedere plek!



- Neem een puntig pincet of een tektang.
- Pak de teek zo dicht mogelijk bij de huid vast en trek hem er voorzichtig uit.
- Ontsmet het wondje.
- Schrijf op waardeer en waar op het lichaam u gebeten bent.
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www.gddrente.nl

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Method

> Extension of PAT annotation scheme
> Implementation in ELAN 5.2
> Pilot Study to validate the annotation scheme
> Corpus selection (15 videos: 7 for Dragging and 8 for Turning victims)
> Corpus annotation with control and reconciliation cycles by two annotators
> Quantitative and qualitative corpus analysis

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Video Corpus

Task	Video#	Organisation	Length (min:sec)	Total (min:sec)
Dragging	1	Rode Kruis Vlaanderen	01:40	
	2	112BHV	00:51	
	3	Oranje Kruis	01:28	
	4	Human Drive	01:09	09:15
Turning	5	Rode Kruis Vlaanderen	01:30	
	6	Oranje Kruis	01:40	
	7	Uitgeversgroep	00:57	
	8	Rode Kruis Vlaanderen	01:05	09:11
Recovery Position	9	112BHV	00:49	
	10	Oranje Kruis	01:48	
	11	Human Drive	01:03	
	12	Uitgeversgroep	01:38	
Prone-To-Supine Roll	13	Oranje Kruis	01:10	
	14	Human Drive	00:58	
	15	REHBO	00:40	

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Annotation in Elan

Screenshot of Annotation in ELAN



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Video Annotation Model

CATEGORY	SUBCATEGORY	VARIABLES
Written Text	Global Structure	Title, Preamble, Instruction, Closing, Extraneous Information
	Action Type	Preparatory, Core, Closing
	Action Status	Obligatory, Alternative, Conditional
	Action Aspect	Process, Result
Image	Control Information	Warning, Condition, Purpose, Manner, Advice, Situation Sketch, Explanation, Other
	Shot Size	Close Up, Medium Shot, Long Shot, Undecidable
	Number of Persons	Zero, One, Two, Three, More than Three Persons, Undecidable
	Image Technique	Still, Snap Shot, Pan, Tilt, Zoom In, Zoom Out, Fade In, Fade Out, Split Screen, Transition
Talk	Any talk by participants or devices in the scene	
Sounds	Any background noises or sound effects	

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Results



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Image Techniques

- to present control information (e.g. Split Screen, Lines)
- to aid the flow of the video (Transitions between shots).



Placing a victim in the recovery position (Het Oranje Kruis, 2017)
Placing a victim in the recovery position (het Oranje Kruis, 2017)
Rautek from the ground (Rode Kruis Vlaanderen, 2012)

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Collaboration

COLLABORATIE MET HET ORANJE KRIJS EN EHBO LEIDEN WEG NAAR DEZE INFORMATIEVIELEN.

het Oranje Kruis boekje



DE OFFICIELE HANDLEIDING VOOR EHBO

<https://www.hetoranjekruis.nl/>



<http://www.ehbogroningen.nl/>

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Testing Design Features

Research question:

- > How should text and pictures be combined to optimise support for users of first-aid MIs?

Measurements:

- . Readers' eye movements, comprehension, recall, and attitudes
- . Users' task performance and judgements

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Standardised Procedure

- > Intro + task description
- > Consent form
- > Demographic questionnaire
- > Read instruction, perform task
- > Comprehension + recall tests
- > Select most preferred MI from a set
- > Semi-structured interview
- > Debriefing

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User Studies: Setting 1



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Layout

							
1. Neem een plastic voorwerp en de hand goed vast pakken.	2. Pak de hand zo dicht mogelijk bij de hand vast.	3. Trek hem voorzichtig uit de hand.	4. Ontsmet het voorwerp met 70% alcohol, polyimiduur of -zaft.	5. Noteer de datum van de behandeling in uw agenda.	HPT (N= 5)	HTP (N= 5)	
							
1. Neem een plastic voorwerp en de hand goed vast pakken.	2. Pak de hand zo dicht mogelijk bij de hand vast.	3. Trek hem voorzichtig uit de hand.	4. Ontsmet het voorwerp met 70% alcohol, polyimiduur of -zaft.	5. Noteer de datum van de behandeling in uw agenda.	VPT (N= 6)	VTP (N= 6)	

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User Studies: Setting 2



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Van der Sluis, I., Eppinga, A. & Redeker, G. (2017)

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Text-Picture Correspondence



1. Leg het voorbereidingsstukje van de voorhanden op de huid. 2. Pak de voorhanden en de voorhanden goed vast. 3. Trek de voorhanden voorzichtig uit de voorhanden. 4. Druk eerst dat de voorhanden zitten en pas de voorhanden aan het voorbereidingsstukje van de voorhanden aan. 5. Druk eerst dat de voorhanden zitten en pas de voorhanden aan het voorbereidingsstukje van de voorhanden aan.

1. 
2. 
3. 
4. 
5. 

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Text References

HOE LEG JE EEN SLACHTOFFER IN DE STABIELE ZIJLIGGING?

- Knie naast het slachtoffer en zorg dat zijn beenen naast elkaar liggen.
- Leg de arm die het verst van je weg is dat je goed bij zijn hand kunt. Pak vervolgens de arm die het dichter bij je is. Leg deze arm zo ver mogelijk omhoog zodat zijn arm en zijn lijf een rechte hoek vormt. Let erop dat je deze arm niet forceert (afbeelding 2).
- Vervolgens buig je de verste arm over de borst van het slachtoffer. Leg deze arm met de handrug tegen zijn wang die het dichter bij je ligt. Houd deze hand vast. Let op: duw zijn hoofd niet oprollen (afbeelding 2).
- Pak het been dat het verste van je verwijduit in met boven de knie aan de buitenzijde vast. Vervolgens trek je dit been op tenzij zijn voet op de grond blijft rusten (afbeelding 2).
- Draai het slachtoffer naar je toe door aan de gebogen kant de handrug tegen zijn wang gedrukt. Draai door totdat de gebogen slachtoffer zijn hoofd op de grond maakt of totdat het slachtoffer niet verder kan draaien (afbeelding 2).

Abbildung 1

Abbildung 2


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Text Length of MIs

- > How should the MI text be shortened to optimise a reader's understanding recall and task execution?
- > Methods: corpus analysis and reader study (online questionnaire)

Van der Sluis, I. & Redeker, G. (in progress)

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Arrows

HOE GEEF JE BIJKSTOTEN?

- Stap 1 Ga achter het slachtoffer staan.
- Stap 2 Zorg dat het slachtoffer ligt voorover-buitg.
- Stap 3 Omvat een hand een vuist. Leg deze op het borstgedeelte van zijn buik. Onder het borstbeen.
- Stap 4 Omvat de vuist met je andere hand. Daarna trek je met beide handen met een ruk schuin omhoog naar je toe.

Step 5


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Reader Study (N=101)

- > In how far do text length and text content affect the cognitive processing and judgement of a recovery position MI?
- Where text content = with or without control information, conditional actions and alternative actions in the text.

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Results of User Studies (i.a.)

- > User Judgements indicate that MI texts
 - are often too long
 - include difficult words
- > Eye-movements during task execution indicate that pictures should best be placed to the right of the text

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Corpus

- > 27 recovery position MIs
- > Including text and pictures
- > Dutch

1. 
Stap 1 Knie naast het slachtoffer en zorg dat zijn beenen naast elkaar liggen.
Leg de arm die het verste van je weg is dat je goed bij zijn hand kunt. Pak vervolgens de arm die het dichter bij je is. Leg deze arm zo ver mogelijk omhoog zodat zijn arm en zijn lijf een rechte hoek vormt. Let erop dat je deze arm niet forceert (afbeelding 2).
Vervolgens buig je de verste arm over de borst van het slachtoffer. Leg deze arm met de handrug tegen zijn wang die het dichter bij je ligt. Houd deze hand vast. Let op: duw zijn hoofd niet oprollen (afbeelding 2).
Draai het slachtoffer naar je toe door aan de gebogen kant de handrug tegen zijn wang gedrukt. Draai door totdat de gebogen slachtoffer zijn hoofd op de grond maakt of totdat het slachtoffer niet verder kan draaien (afbeelding 2).

2. 
Stap 2
Abbildung 1
Abbildung 2
Step 3
Step 4
Step 5
Step 6
Step 7
Step 8
Step 9
Step 10
Step 11
Step 12
Step 13
Step 14
Step 15
Step 16
Step 17
Step 18
Step 19
Step 20
Step 21
Step 22
Step 23
Step 24
Step 25
Step 26
Step 27

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Corpus Analysis

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Action State	Total	Short	Long	Short	Long	
OA Obligatory Action	409	15.15 (4.27)	186	223	13.29 (4.40)	17.15 (3.03)
CA Conditional Action	45	1.67 (1.15)	13	32	0.93 (0.70)	2.46 (1.01)
AA Alternative Action	5	0.19 (0.77)	1	4	0.07 (0.26)	0.31 (1.07)
CI- Controle Information						
Explanation	64	2.37 (1.66)	31	33	2.21 (1.66)	2.54 (1.65)
Motivation	34	1.26 (1.07)	17	17	1.21 (1.26)	1.31 (0.82)
Warning	9	0.35 (0.77)	1	8	0.07 (0.26)	0.62 (1.00)
Condition	5	0.19 (0.55)	3	2	0.21 (0.56)	0.15 (0.53)
Situation Sketch	4	0.15 (0.36)	3	1	0.21 (0.41)	0.08 (0.27)
Advise	3	0.11 (0.31)	2	1	0.14 (0.35)	0.08 (0.27)
Other	3	0.11 (0.42)	2	1	0.14 (0.52)	0.08 (0.27)

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Procedure Online Questionnaire

- > Introduction
- > Consent
- > Task: Read instruction carefully
- > Demographic questionnaire
- > Photo test
- > Gap filling test (varied per text)
- > Statements (agree/disagree)
- > Debriefing

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Material

1. Introduction
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Step 1.
Knie naast het slachtoffer en zorg dat zijn benen naast elkaar liggen. Als het slachtoffer een bril draagt, neem die dan af en leg de bril op een veilige plek.

Step 2.
Leg de arm die het verst van je weg is zo dat je goed bij zijn hand kunt. Pak vervolgens de arm die het dichtste bij je is. Leg deze arm nu zo neer zodat zijn arm en zijn lijf een rechte hoek vormen. Let erop dat je deze arm niet forceert.

Oranje Kruis
- long
- with CA,AA,CI

Manipulation
- short
- no CA,AA,CI

Layar
- short
- with CA,AA,CI

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Photo test (Visual Recognition)

- > 8 sets with 2 photo's with obligatory actions presented in chronological order



"Indicate in which of the two photographs the presented action is properly executed and explain why."

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Hypotheses

- > H1: Short MI texts are easier to process and judged more positively by the reader than long MI texts
- > H2: Redundancy between textual and pictorial information has an effect on the reader's processing and judgements

Test for potential effects of age, gender, education and first-aid/RP experience

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Gap Filling (Textual Recall)

- > Per MI step a noun was removed e.g., 'cheek', 'breathing'
- > In each text 8 words were removed
- > NB: Varied per text
- > Like the MI, this was presented per step
- > Participants indicated their confidence on their performance

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Results

- > Reader judgments show no significant differences for text length and text content.
- > Textual recall **and** visual recognition seem higher with short texts.
- > Readers appreciate redundancy
- > High judgments of the completeness of the text do not lead to lower judgments of the importance of pictures.
- > Readers expect better task execution with short instructions.

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Results (3)

Instruction Executable



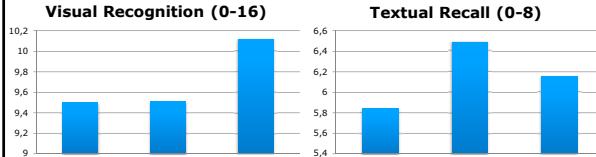
Condition	Score
Oranje Kruis	3,85
Manipulatie	4,0
Layar	4,0

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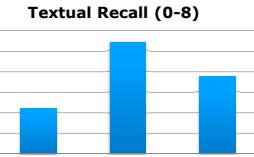
Results (1)

Visual Recognition (0-16)



Condition	Score
Oranje Kruis	9,5
Manipulatie	9,5
Layar	10,1

Textual Recall (0-8)



Condition	Score
Oranje Kruis	5,8
Manipulatie	6,4
Layar	6,1

Confidence Score



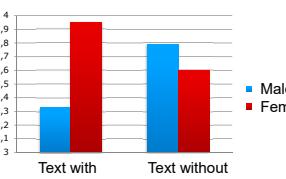
Condition	Score
Oranje Kruis	3,7
Manipulatie	3,8
Layar	3,9

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Gender Differences

Text not too Short



Gender	Score
Male	3,3
Female	3,9

Text without CA,AA,CI



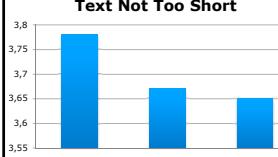
Gender	Score
Male	3,4
Female	3,4

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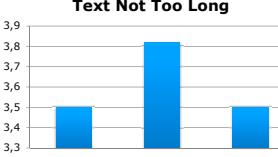
Results (2)

Text Not Too Short



Condition	Score
Oranje Kruis	3,75
Manipulatie	3,65
Layar	3,65

Text Not Too Long



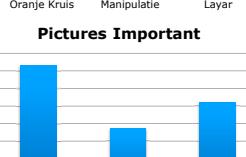
Condition	Score
Oranje Kruis	3,45
Manipulatie	3,8
Layar	3,55

Text Complete



Condition	Score
Oranje Kruis	3,75
Manipulatie	3,45
Layar	3,65

Pictures Important



Condition	Score
Oranje Kruis	4,1
Manipulatie	3,6
Layar	3,8

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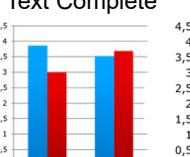
Educational Differences

Textual Recall



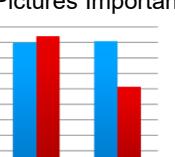
Education	Score
Higher education	5,5
Lower education	6,0

Text Complete



Education	Score
Higher education	6,5
Lower education	5,5

Pictures Important



Education	Score
Higher education	3,8
Lower education	4,0

Legend:
Blue square: Higher education
Red square: Lower education

To Conclude

- › To identify and test relevant parameters of variation, we conduct corpus studies and user studies.
- › We have iteratively refined our annotation scheme, which has been used to annotate our growing corpus of currently about 300 first-aid instructions (the PAT corpus).

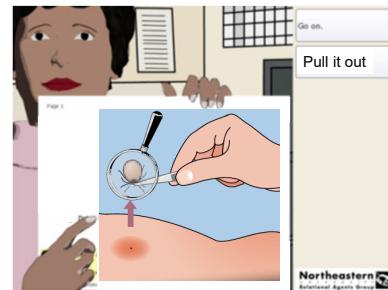
Applications

- › Develop and implement (semi-)automatic solutions for:
 - Document segmentation
 - NLP parsing and annotation of text segments
 - Image processing and picture annotation
 - Annotation of relations
 - Generation of (parts of) MIs
 - Crowd-sourced evaluation of MIs
 - Evaluation to predict MI effectiveness

Future Corpus Work

- › More fine-grained models to annotate functional and content relations between e.g., pictures and text (words, clauses, sentences)
- › Annotation of our whole corpus (several hundred first-aid MIs) also using gamification
- › Extension to document types other than first-aid instructions
- › Video annotation

Tailored First-aid Instructor

Northeastern
Relational Agents Group

Future User Studies



- › Class room evaluation
- › Test MIs for other tasks
- › Added value of pictorial information
- › Demographic variables of users

Special Thanks

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K.N.V. EHBO	• Arie Wolters, Ineke van der Beek
CIS students	• Most notably: Anne Nienke Eppinga, Renate Vergeer, Charlotte Vijfvinkel, Stephanie Buisman



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Method

1. Verb selection in MIs using Alpino (Van Noord, 2006)
TOTAL NUMBER OF VERBS = 2388
2. Manual exclusion of warnings, modalised, negated and conditional actions MAIN VERBS = 1411
3. Selection of hyperonyms 282 unique verbs using Cornetto (Vossen et al., 2013)
4. Abstraction from hyperonyms using Cornetto 2.0 synset XML and other sources
5. Further analysis of 21 hyperonyms with a frequency > 1%

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Van der Sluis, I., Vergeer, R. & Redeker, G. (2018)

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PAT Relation Identification

- > How can the constituent actions in Dutch first aid procedures be identified and categorised by (semi-)automatic natural language analysis?
- > Goal: use the resulting action categories to identify picture-text relations in MIs.

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Hyperonym Sources

SOURCE	UNIQUE VERBS	TOTAL NUMBER OF VERBS
Cornetto 2.0 DB	127 (45.0%)	938 (66.5%)
Cornetto Demo	118 (41.8%)	365 (25.3%)
Van Dale Dictionary	25 (8.9%)	83 (5.9%)
Prefix stripping	12 (4.3%)	25 (1.7%)
Total	282 (100%)	1,411 (100%)

> Cornetto provides hyperonyms for two thirds of the MI lemma's.

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Corpus

- > 78 MIs
- > Published in two editions of Het Oranje Kruis Boekje (2011, 2016)
- > Overlap in terms of the first aid tasks:
 - . 25 tasks appear in both editions (yielding 50 MIs),
 - . and 28 appear only in one edition.

	SYNSET CATEGORIES	FREQ.	TRANSLATED EXAMPLES (MI NUMBER)
1.	handelen (to do)	155 (11%)	Repeat these last steps until you are out of the danger zone. (903)
2.	veranderen (to change)	57 (4.0%)	Someone has immediately become seriously ill. (987) You take turns in resuscitating every 2 minutes. (958)
2.1	vastmaken (to attach)	61 (4.3%)	Attach the bandage with adhesive plaster or a bandage clip. (933)
2.2	bewerken (to manipulate)	28 (2.0%)	Prepare the breathing mask for use. (959)
2.3	dekken (to cover)	17 (1.2%)	Then you cover the wound with a sterile bandage. (971)
2.4	draaien (to turn)	31 (2.2%)	Place your hand on his forehead and tilt his head towards yours. (911)
2.5	brengen (to bring)	23 (1.6%)	Put a stiffed victim in a half-sitting position and support him. (980)
3.	houden (to hold, to keep)	32 (2.5%)	Hold his head in the position in which you found it. (979) Keep clinging clothing wet. (939)
4.	geven (to give)	26 (1.8%)	This is how you give enough support without squeezing. (973)
5.	voortbewegen (to propell)	20 (1.6%)	Slide both your arms under the victim's armpits. (951)
5.1	verplaatsen (to move)	35 (2.5%)	Lift him by stretching your legs. (902)
5.1.1	plaatsen (to put, to place)	99 (7.0%)	Place the CPR face shield on the victim's face. (921)
5.1.2	consumeren (to consume)	28 (2.0%)	Give a child something lukewarm with a lot of sugar to drink. (988)
5.1.3	verwijderen (to remove)	22 (1.6%)	Remove any (medicine) plasters from the victim. (957)
5.1.4	trekken (to pull)	25 (1.8%)	Carefully separate the eyelids with thumb and index finger. (935)
5.1.5	duwen (to push)	38 (2.7%)	Push the victim on his side. (905)
6.	onderzoeken (to investigate)	20 (1.4%)	Judge his breathing and start resuscitating. (914)
6.1	waarnemen (to observe)	32 (2.3%)	Call the emergency services, the emergency officer on the phone will hear you. (954)
6.1.1	zien (to see)	54 (3.8%)	Judge his breathing by looking, listening and feeling for 10 secs. (911)
7.	contacteren (to contact)	18 (1.3%)	Otherwise, call the GP's emergency number or call the GP centre. (982)
8.	schoonmaken (to clean)	15 (1.1%)	Rinse the victim's eye for 15 minutes with lukewarm

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Potential Improvements

- > Improvement of existing tools to automatically analyse the Dutch MI dataset
- > Categorisation of the verbs in the PAT corpus
- > More detailed analyses including aspect, modality, and adverbial specifications of manner
- > More fine-grained visual analysis identifying posture, gaze, and the positions of persons

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H2: Teksthoud

		Oranje Kruis + Layar	Manipulatie
Tekst te kort	Man	3.33 (1.07), N=22	3.79 (0.89), N=15
	Vrouw	3.95 (0.88), N=39	3.60 (0.96), N=25

MANOVA = ($F = 3.842, p = 0.053$, partial $\eta^2 = 0.040$)

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Participant Characteristics (N=101)

	Oranje Kruis	Manipulation	Layar
Age (M, std)	42 (14.70)	31 (11.15)	36 (14.75)
Male	11 (33.3%)	15 (37.5%)	11 (39.3%)
Female	22 (60.6%)	25 (62.5%)	17 (60.7%)
Lower education	4 (12.1%)	7 (17.5%)	6 (21.4%)
Higher education	29 (87.9%)	33 (82.5%)	22 (78.6%)
First-aid experience	20 (60.6%)	22 (55.0%)	19 (67.8%)
No first-aid experience	13 (39.4%)	18 (45.0%)	9 (32.1%)
RP experience	14 (42.4%)	22 (55.0%)	18 (64.3%)
No RP experience	19 (57.6%)	17 (42.5%)	10 (35.7%)
RP not indicated	-	1 (2.5%)	-

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H2: Teksthoud

		Oranje Kruis + Layar	Manipulatie
Tekstuele oproepbaarheid	Laag opgeleiden	6.40 (1.51), N=10	5.34 (2.64), N=7
	Hoog opgeleiden	5.90 (1.80), N=51	6.72 (1.37), N=33
Belang afbeelding-en	Laag opgeleiden	4.20 (0.63), N=10	2.57 (1.27), N=7
	Hoog opgeleiden	4.00 (1.09), N=51	4.03 (1.00), N=33

Tekstuele oproepbaarheid ($F = 3.718, p = 0.057$, partial $\eta^2 = 0.038$)
 Belang afbeeldingen ($F = 8.663, p = 0.004$, partial $\eta^2 = 0.085$)

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H1: Tekstlengte

- > Oranje Kruis versus (Manipulatie + Layar)

	Opleidings-niveau	Lang	Kort
Tekst compleet	Laag opgeleiden	3.00 (0.71), N=4	3.69 (0.97), N=13
	Hoog opgeleiden	3.86 (0.72), N=29	3.52 (0.93), N=55

MANOVA ($F = 3.631, p = 0.060$, partial $\eta^2 = 0.038$)

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Resultaten

Variabele	Oranje Kruis	Manipulatie	Layar
Visuele herkenning (0-16)	9.50 (3.06)	9.51 (2.77)	10.12 (3.25)
Tekstuele oproepbaarheid (0-8)	5.84 (1.83)	6.49 (1.70)	6.15 (1.67)
Confidentie score	3.72 (0.65)	3.79 (0.86)	3.90 (0.85)
Tekst niet te kort	3.78 (0.98)	3.67 (0.93)	3.65 (1.02)
Tekst niet te lang	3.50 (1.30)	3.82 (0.76)	3.50 (1.07)
Afbeeldingen belangrijk	4.13 (1.01)	3.77 (1.18)	3.92 (1.06)
Tekst compleet	3.75 (0.76)	3.51 (0.91)	3.62 (0.98)
Instructie uitvoerbaar	3.88 (0.71)	4.00 (0.82)	4.00 (0.80)

MANOVA ($F = 0.725, p = 0.766$, Wilk's $\Lambda = 0.879$, partial $\eta^2 = 0.062$)

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Hypothesis Testing

H1: Text Length n.s.
 MANOVA Oranje Kruis vs. Manipulation, Layar
 $F = 0.734, p = 0.661$, Wilk's $\Lambda = 0.937$, partial $\eta^2 = 0.063$

H2: Text Content n.s.
 MANOVA Oranje Kruis, Layar vs. Manipulation
 $F = 1.147, p = 0.340$, Wilk's $\Lambda = 0.906$, partial $\eta^2 = 0.094$

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 MA thesis, Eppinga, 2017

User study Tick Removal Instruction



Participants: 22 mothers who had no first aid certificate and no experience with tick removal.

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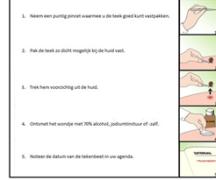
Demographical Effects

- Significant effects for Education:
 - Textual Recall,
 - Text Complete,
 - Pictures Important,
 but only for conditions with few participants with a lower education level; risk of statistical artefact.
- Significant effect of gender for Text Not Too Short.
 - Men rate texts with extra information (Oranje Kruis, Layar) much lower than women, but rate the (short!) manipulated version higher than women, who show a reversed pattern.

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Results

- No differences in understandability
- But scores on **performance, recall, and attractiveness** are highest when pictures are presented to the left of the text.



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Results

(1 = incomprehensible to 7 = comprehensible)

		HPT	HTP	VPT	VTP
Performance	Duration (sec)	68.9	71.8	69	71.1
	N of errors	0.5	3	2	1
	N of Switches	7.8	5.2	7.8	4.8
Recall	Free (5 actions)	4.4	4.6	3.7	4.5
	Cued (7 actions)	4.4	5.2	5.2	5.3
Comprehension		6.5	6.5	6.7	6.4
Attractiveness	Most attractive	4 (18%)	0 (0%)	8 (36%)	10 (45%)
	Least attractive	4 (18%)	16 (72%)	1 (4.5%)	1 (4.5%)

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Corpus study

- Small case study: 15 Dutch tick removal instructions from public online sources
- Huge variation:
 - Position of text and pictures
 - Amount of text
 - Organisation of text
 - Type and status of actions
 - Control information

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Description of Text

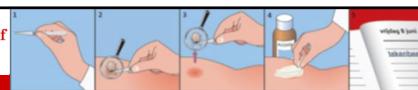
Attribute	Subcategory	Value
Composition	Textual elements	Preamble, Instruction, Closing
	Action structure	Preparatory, Core, Closing, Other
General characteristics	Title	'Wat te doen bij een tekenbeet'
	Number of steps	M=5.5, std=1.68
	Number of sentences	M=11.4, std =3.22
Action status (process)	Obligatory	take, grab, pull out, disinfect, write down
	Alternative	in the case of failure visit GP
Control Information	Warning	do not damage the tick
	Explanation	about Lyme disease dangers

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Evaluation Method

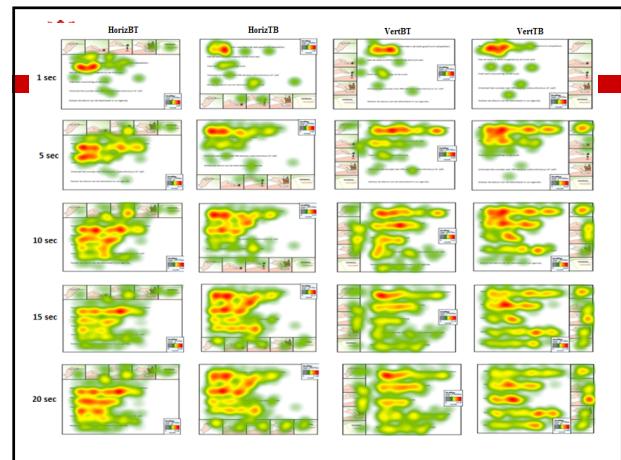
- > User studies to evaluate document design in situated use
- > Case:
RQ: How does the layout of text and pictures affect comprehension, recall, performance and attractiveness?
- > 4 conditions, 22 mothers participated

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Description of Pictures

Attribute	Subcategory	Value
General characteristics	Objects	tweezers, magnifying glass, arrow, tick, wound, flask with alcohol, wipe, agenda
	Body parts	human hands, skin
Actions	Result	'pick up tweezers', 'grab the tick', 'write down the date'
	Process	'pull the tick out', 'disinfect the wound'
Control Information	Explanation	Magnifying glass
	Warning	Exclamation mark



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Text-Picture Relations

	Action	Action type T	Verbalised Actions	Action Type P	Visualised Actions
Preparatory Actions	Do not drip any liquids on the tick	Process	1	-	-
	Pick up the tweezers	Process	9	Result	15
Core Actions	Grab the tick	Process	14	Result	15
	Pull the tick out	Process	15	Process	15
Closing Actions	Desinfect wound	Process	14	Process	15
	Wash hands	Process	1	-	-
	Write down the date	Process	13	Result	15
	Take a photograph of the wound	Process	1	-	-
	Monitor health	Process	1	-	-
	Visit GP	Process	2	-	-