APPENDIX A: SUMMARY OF COGNITIVE STYLES RESEARCH REVIEWED BY RIDING AND CHEEMA (1991)

Holistic – Analytic Style Dimension		
Style labels	**Theorist**	**Basic description**
Field dependence (FD) – independence (FI)	Witkin (1962)	Field Dependence (FD) - rely on external frames of reference, prefer group interaction, like structure. Field Independence (FI) – rely on internal frames of reference, prefer to work on individual tasks, like to impose their own structure.
Impulsivity – Reflectivity	Kagan (1964)	Impulsive style characterised by quick responses to request to undertake task, whereas the reflective style will deliberate over the issue before providing a response.
Convergent - Divergent thinkers	Guilford (early 1950's)	Convergent thinkers deal best with problems which require the ability to generate one correct answer, while divergent thinkers are perform well when required to generate several equally acceptable answers.
Levellers - Sharpeners	Holzman & Klein (1954)	Focuses primarily on how a visual task is perceived. Levellers tend to perceive a task very simply and assimilate new events with previously stored ones, while sharpeners perceive a task in a complex and differentiated fashion, with little assimilation.
Holists - serialists	Pask (1972)	Holists will scan large amounts of data and look for patterns, while serialists will examine less data and use a step-by-step approach when completing a task.
Verbaliser-Imager Style Dimension		
Style Label	**Theorist**	**Basic description**
Abstract – concrete	Harvey (1961)	Preferred level and capacity of abstraction.
Verbaliser - visualiser	Paivio (1971), Riding and Taylor (1976), Riding and Calvey (1981)	Visualisers better than verbalisers in the recall of high imagery material. Will use either verbal or visual strategies to represent knowledge and thinking.

APPENDIX B: LETTER REQUESTING PERMISSION TO CONDUCT THE STUDY AND LETTER PROVIDING THIS CONSENT

12 September 2005

Head of Department: Department of Physiology

Faculty of Health Sciences

Basic Medical Sciences Building – 9-8

University of Pretoria

0002

Dear Prof van Papendorp

PERMISSION TO CONDUCT PhD RESEARCH USING PHYSIOLOGY AS CONTEXT AND CONTENT

I am currently registered as a PhD student in the Faculty of Education at the University of Pretoria. My research proposal outlines a study which aims to investigate the relationship between cognitive load and cognitive styles when using animations as learning resources within a specific content domain. I attach an executive summary of my proposal. I successfully defended my proposal on the 22 April 2005.

My work in the field of multimedia development over the last five years has primarily been in the health sciences education field. This is a field which makes extensive use of multimedia learning resources. As such I would like to use the context of health sciences education in general, and physiology education in particular for my research. It is also my aim to base this research in a setting which is as authentic as possible – in other words, to take content which must be studied by all students who take physiology as part of their curriculum. Many research studies in this field use content which is not part of the student's normal curriculum. There is a need for research which uses more authentic learning experiences.

I therefore request permission to develop multimedia content which covers various sections of the physiology of the renal system, and to use the students at UP who take physiology as a subject as participants in the study. On completion of the study all content developed will be given to the University of Pretoria.

There will be two phases in this research. The detail about the times and particular student groups are outlined on the table below.

Phase	Student group	No of participants	Time frame	Duration of experiment
Pilot study	Students doing Physiology which is not part of the MBChB program	80 – 120	February 2006	2 sessions **First** – 20 – 30min **Second** – 1.5 - 2 hours
Larger study	MBChB students – during	400 - 500	April / May 2006	2 sessions

	Other students in the Faculty of Health Sciences		Whenever it fits into their curriculum	**First** – 20 – 30min **Second** – 1.5 - 2 hours

I will therefore require approximately 2 hours of time from each student who participates in the study. These sessions will be conducted in the computer laboratories on with the Hatfield campus or the Prinshof campus. Participation will be voluntary. I furthermore request permission to approach the lecturers in your department who teach the physiology of the renal system to serve as the content experts who will guide the development. I will continue with the necessary application and ethical review with the appropriate committees should you give me permission to undertake this study.

Yours sincerely

Anne Strehler

Student No: 77006799

APPENDIX C: PERMISSION FROM SMITH (2007) TO USE DATA FROM HER STUDY

P O Box 74000
Lynnwood Ridge
0040

20 February 2008

Department of Statistics
University of Pretoria
Pretoria

Dr M v. d. Linde

I, M E Smith, hereby grant Anne Strehler permission to use any of the datasets from the research project DPG9077 - OD425993 - T06028 as required.

Regards

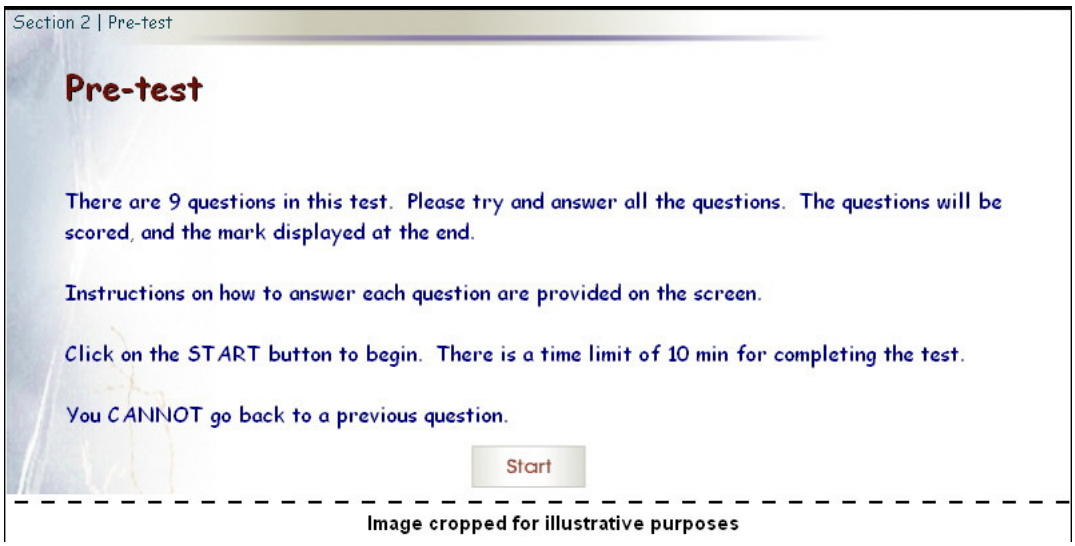
_____

M E Smith

Student nr 72224089

APPENDIX D: PRE TEST / POSTTEST: COMPUTER-BASED TEST

Knowledge questions



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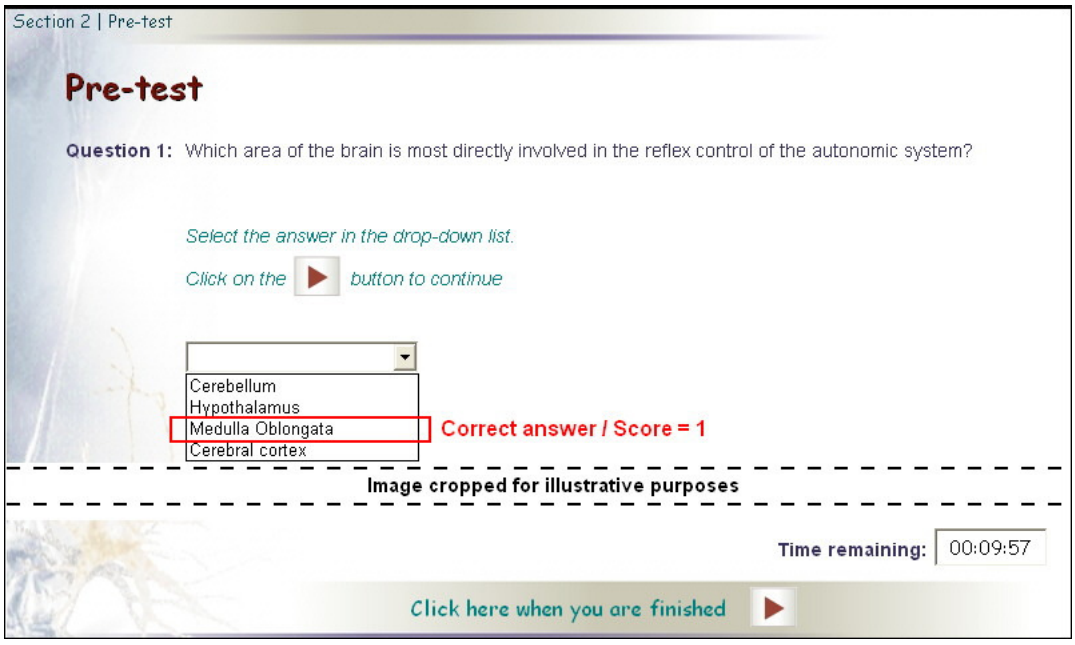

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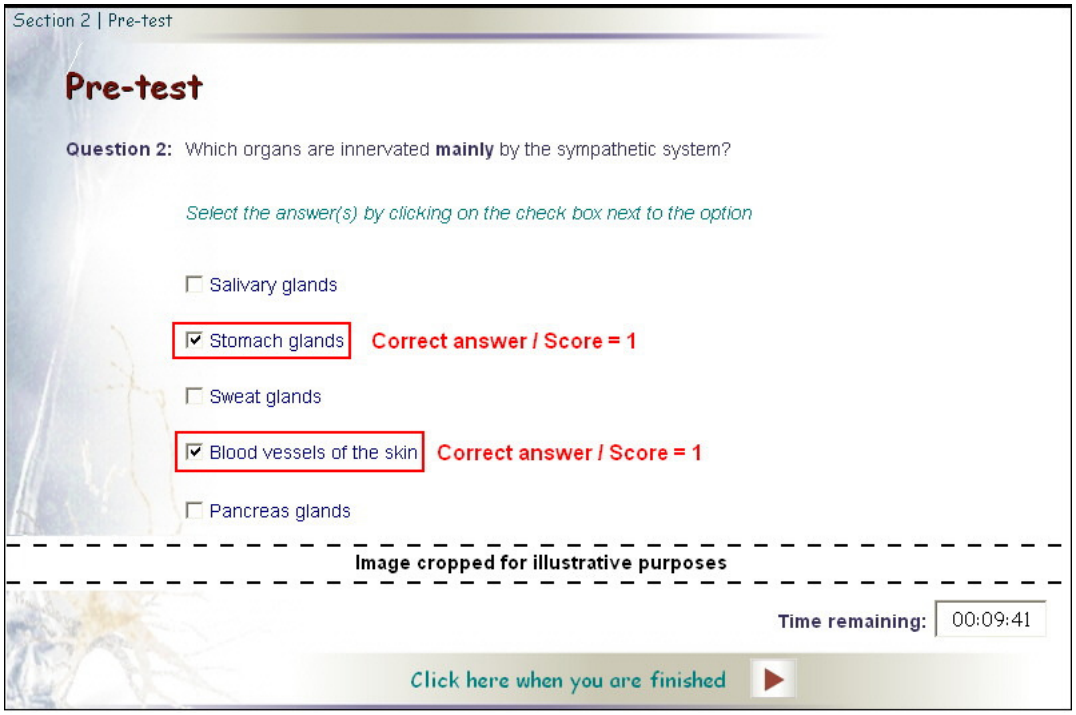
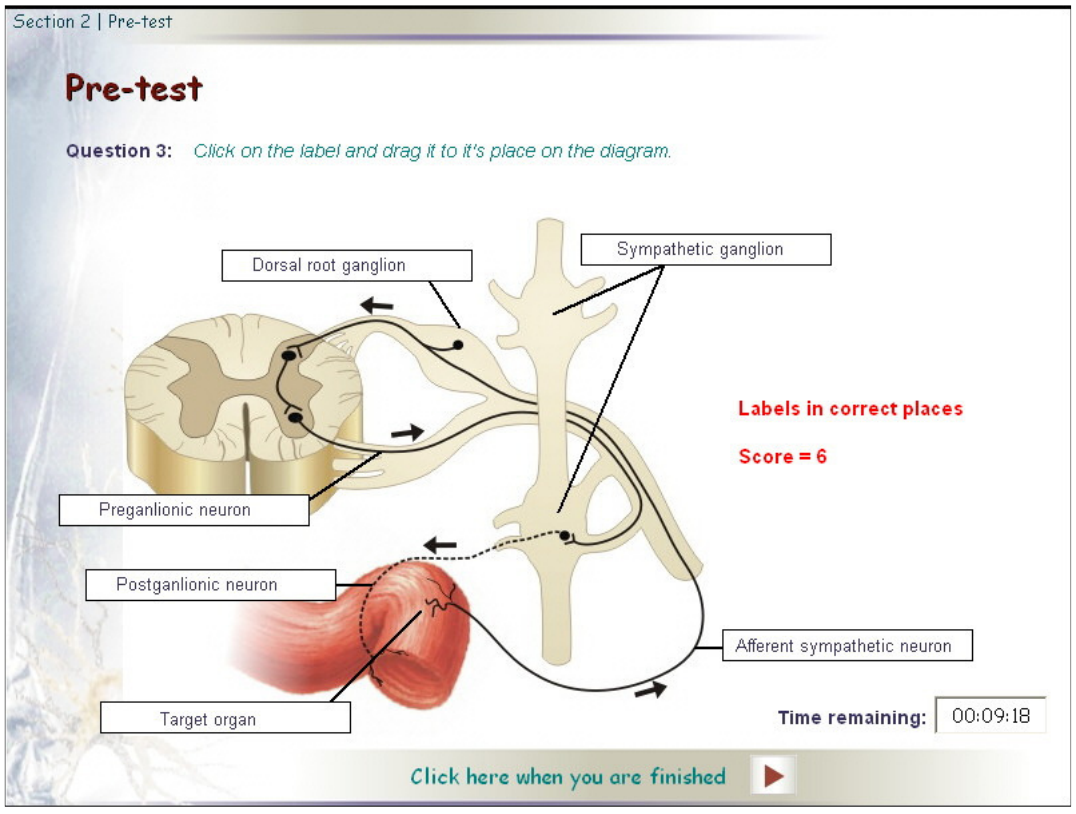
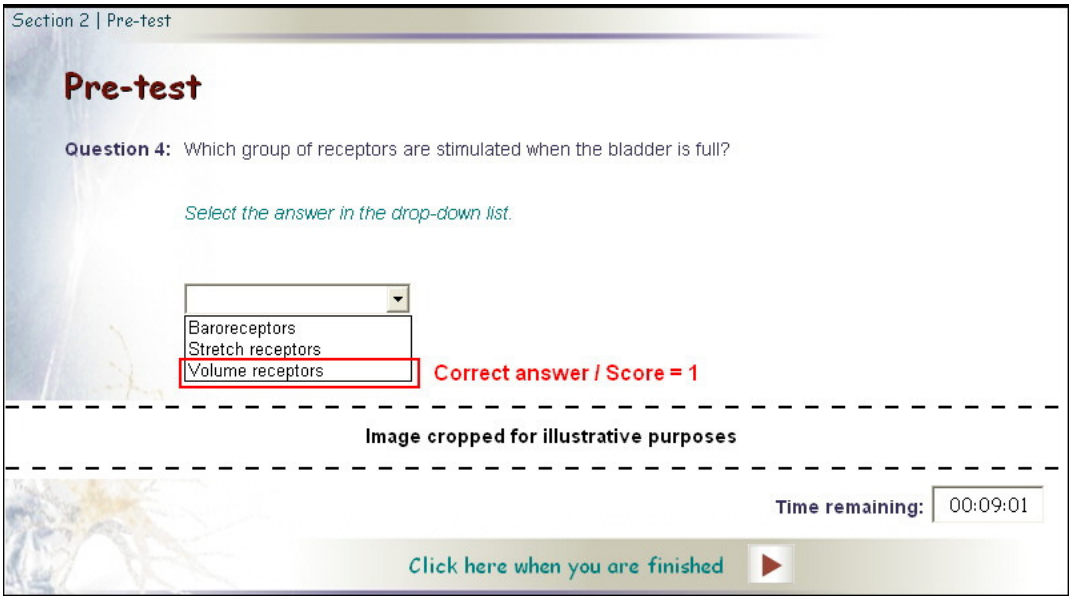
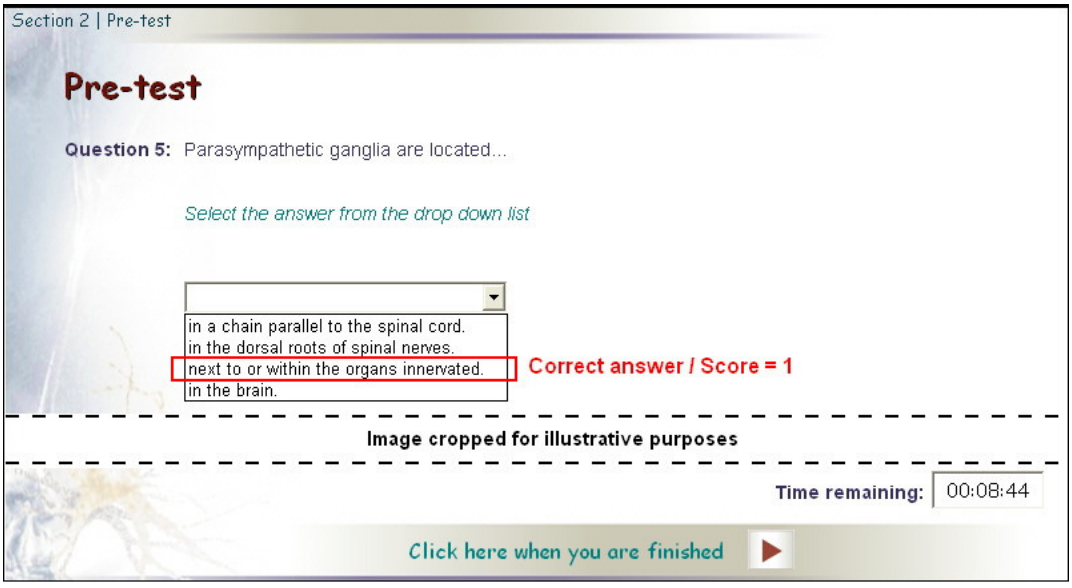
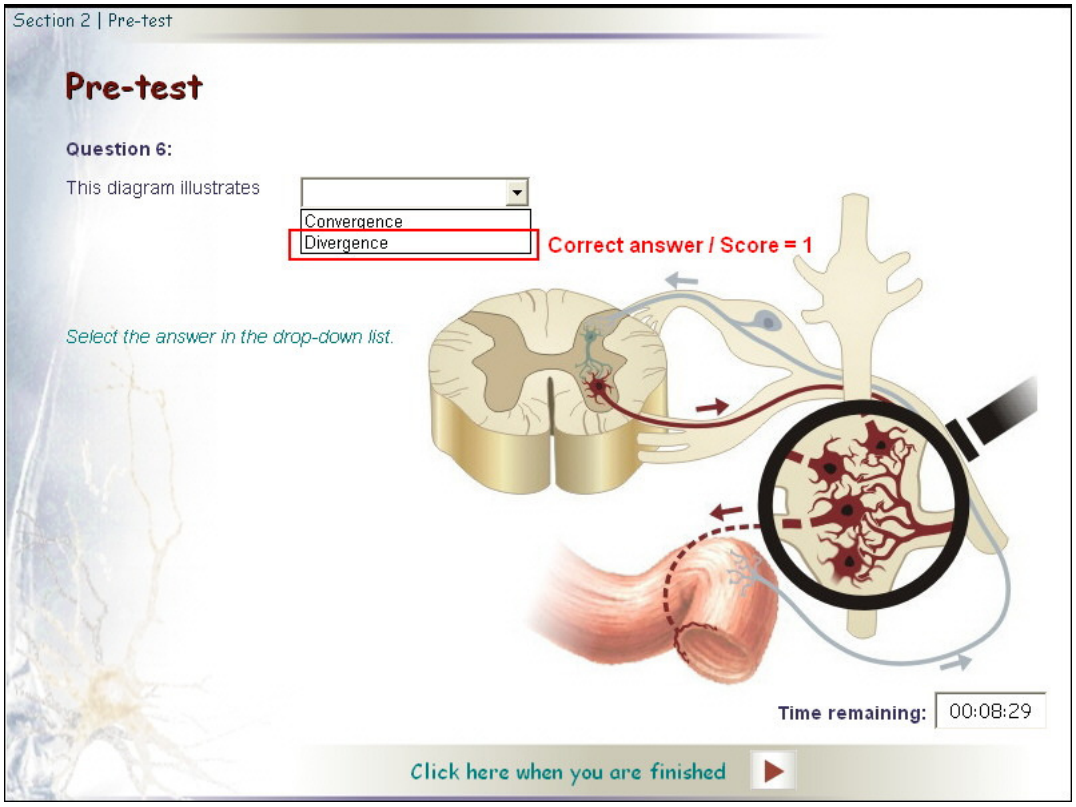
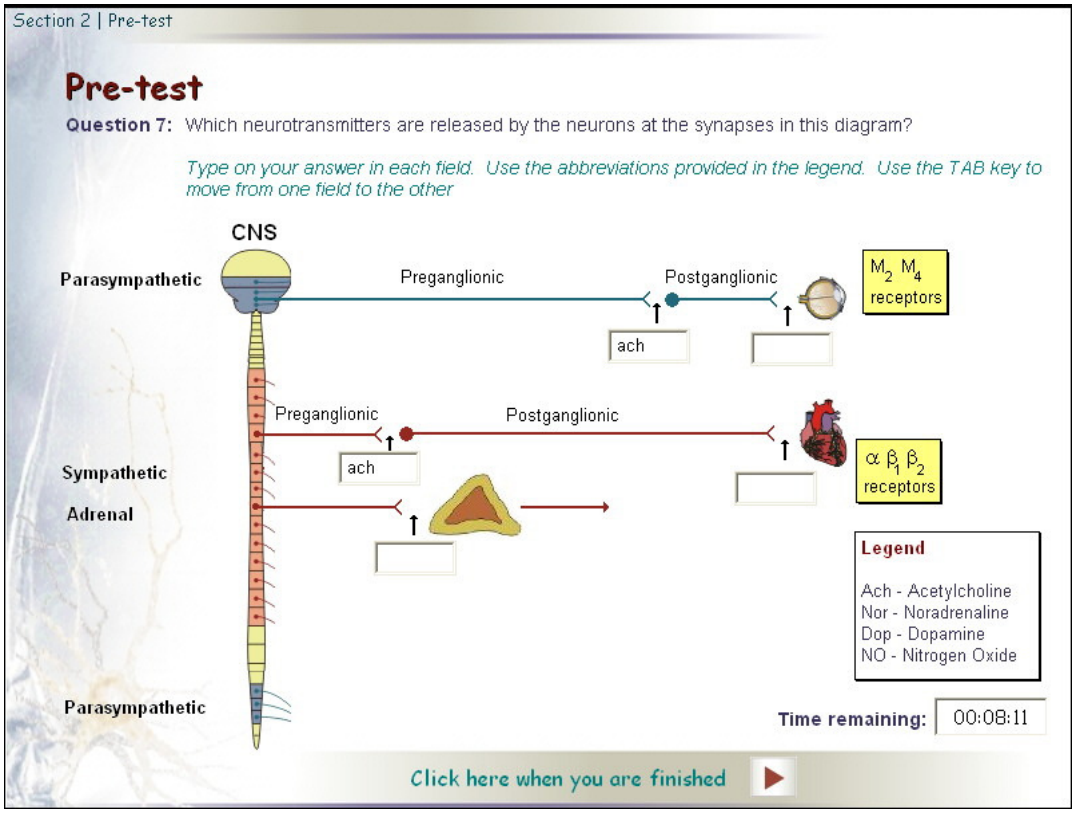

Section 2 | Pre-test
Pre-test
Question 2: Which organs are innervated mainly by the sympathetic system?
Select the answer(s) by clicking on the check box next to the option
Salivary glands
Stomach glands
Correct answer / Score = 1
Sweat glands
Blood vessels of the skin
Correct answer / Score = 1
Pancreas glands
Image cropped for illustrative purposes
Time remaining: 00:09:41
Click here when you are finished


Section 2 | Pre-test
Pre-test
Question 3: Click on the label and drag it to it's place on the diagram.
Dorsal root ganglion
Sympathetic ganglion
Preganlionic neuron
Postganlionic neuron
Afferent sympathetic neuron
Target organ
Labels in correct places
Score = 6
Time remaining: 00:09:18
Click here when you are finished


Section 2 | Pre-test
Pre-test
Question 4: Which group of receptors are stimulated when the bladder is full?
Select the answer in the drop-down list.
Baroreceptors
Stretch receptors
Volume receptors
Correct answer / Score = 1
Image cropped for illustrative purposes
Time remaining: 00:09:01
Click here when you are finished


Section 2 | Pre-test
Pre-test
Question 5: Parasympathetic ganglia are located...
Select the answer from the drop down list
in a chain parallel to the spinal cord.
in the dorsal roots of spinal nerves.
next to or within the organs innervated.
in the brain.
Correct answer / Score = 1
Image cropped for illustrative purposes
Time remaining: 00:08:44
Click here when you are finished


Section 2 | Pre-test
Pre-test
Question 6:
This diagram illustrates
Convergence
Divergence
Correct answer / Score = 1
Select the answer in the drop-down list.
Time remaining: 00:08:29
Click here when you are finished


Section 2 | Pre-test
Pre-test
Question 7: Which neurotransmitters are released by the neurons at the synapses in this diagram?
Type on your answer in each field. Use the abbreviations provided in the legend. Use the TAB key to move from one field to the other
CNS
Parasympathetic
Preganglionic
Postganglionic
M2 M4 receptors
ach
Preganglionic
Postganglionic
ach
Sympathetic
Adrenal
α β1 β2 receptors
Legend
Ach - Acetylcholine
Nor - Noradrenaline
Dop - Dopamine
NO - Nitrogen Oxide
Parasympathetic
Time remaining: 00:08:11
Click here when you are finished

Section 2 | Pre-test

Pre-test

Question 8: What effect does increased sympathetic stimulation have on the following organs?

Select the answer from the drop-down list next to each organ

Heart

Increases heart rate
Decreases heart rate

Correct answer / Score = 1

Pupils

Constrict
Dilate

Correct answer / Score = 1

Bladder

Wall relaxes - bladder fills
Wall contracts - bladder empties

Correct answer / Score = 1

Salivary glands

No effect whatsoever
Secretes large amount of watery enzyme-rich saliva
Secretes small amounts of a thick viscous secretion

Correct answer / Score = 1

Time remaining: 00:07:57

Click here when you are finished

Section 2 | Pre-test

Pre-test

Question 9:

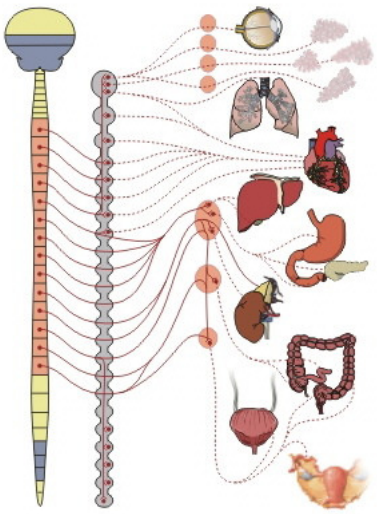
This diagram illustrates the

Autonomic Nervous System
Enteric Nervous System
Parasympathetic Nervous System
Sympathetic Nervous System

Select the answer in the drop-down list.

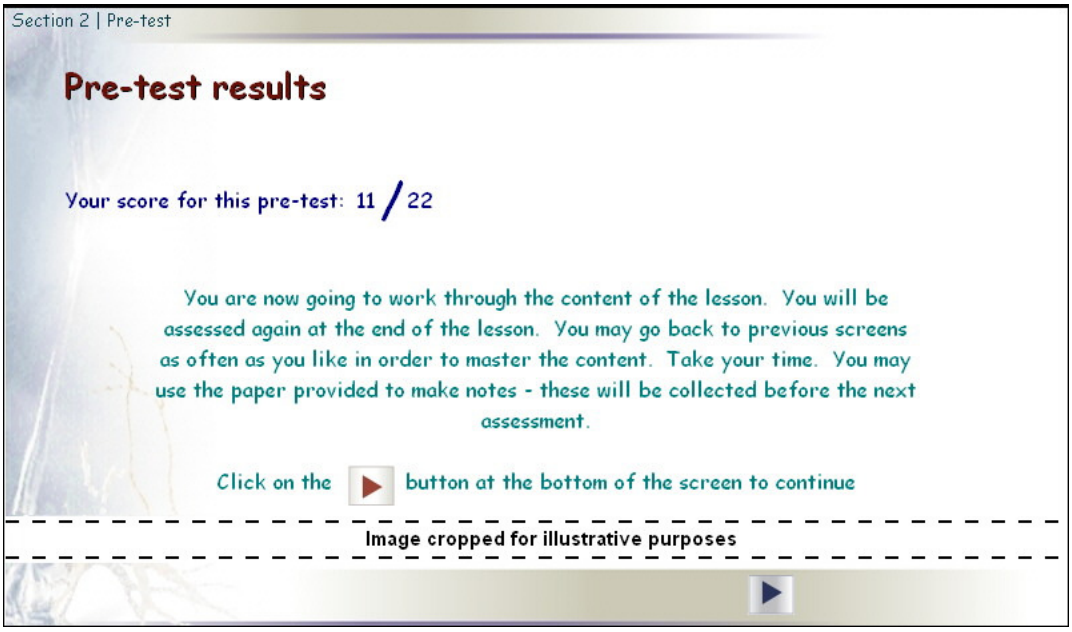
Correct answer / Score = 1

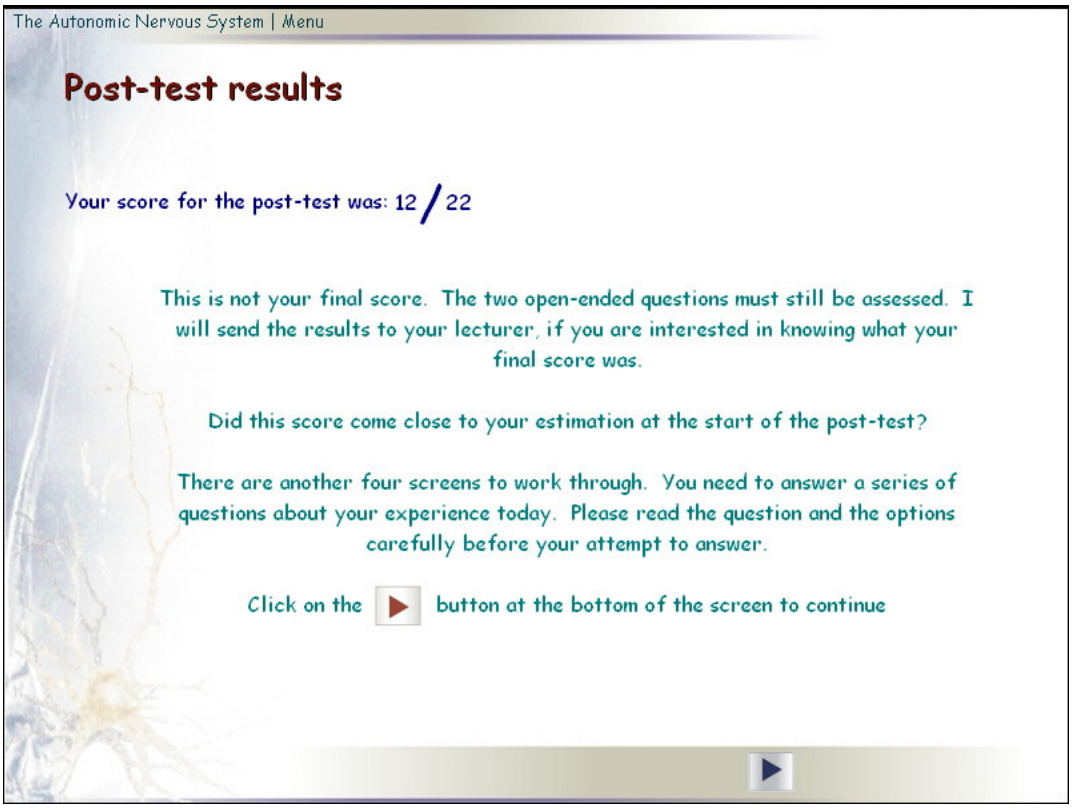
Click on the ▶ *button to continue*



Time remaining: 00:07:02

Click here when you are finished


Section 2 | Pre-test
Pre-test results
Your score for this pre-test: 11 / 22
You are now going to work through the content of the lesson. You will be assessed again at the end of the lesson. You may go back to previous screens as often as you like in order to master the content. Take your time. You may use the paper provided to make notes - these will be collected before the next assessment.
Click on the button at the bottom of the screen to continue
Image cropped for illustrative purposes


The Autonomic Nervous System | Menu
Post-test results
Your score for the post-test was: 12 / 22
This is not your final score. The two open-ended questions must still be assessed. I will send the results to your lecturer, if you are interested in knowing what your final score was.
Did this score come close to your estimation at the start of the post-test?
There are another four screens to work through. You need to answer a series of questions about your experience today. Please read the question and the options carefully before your attempt to answer.
Click on the button at the bottom of the screen to continue

APPENDIX E: FINAL TWO QUESTIONS OF THE POST TEST

Student No: .....

Question 10: You are on holiday at the sea. A swimmer narrowly escapes a shark attack. You go to see if you can help. Fortunately there are no injuries, but the person is very shocked.

Describe the clinical symptoms you would expect to see, and provide adequate information about what you see and why you see these symptoms? [10]

Answer:

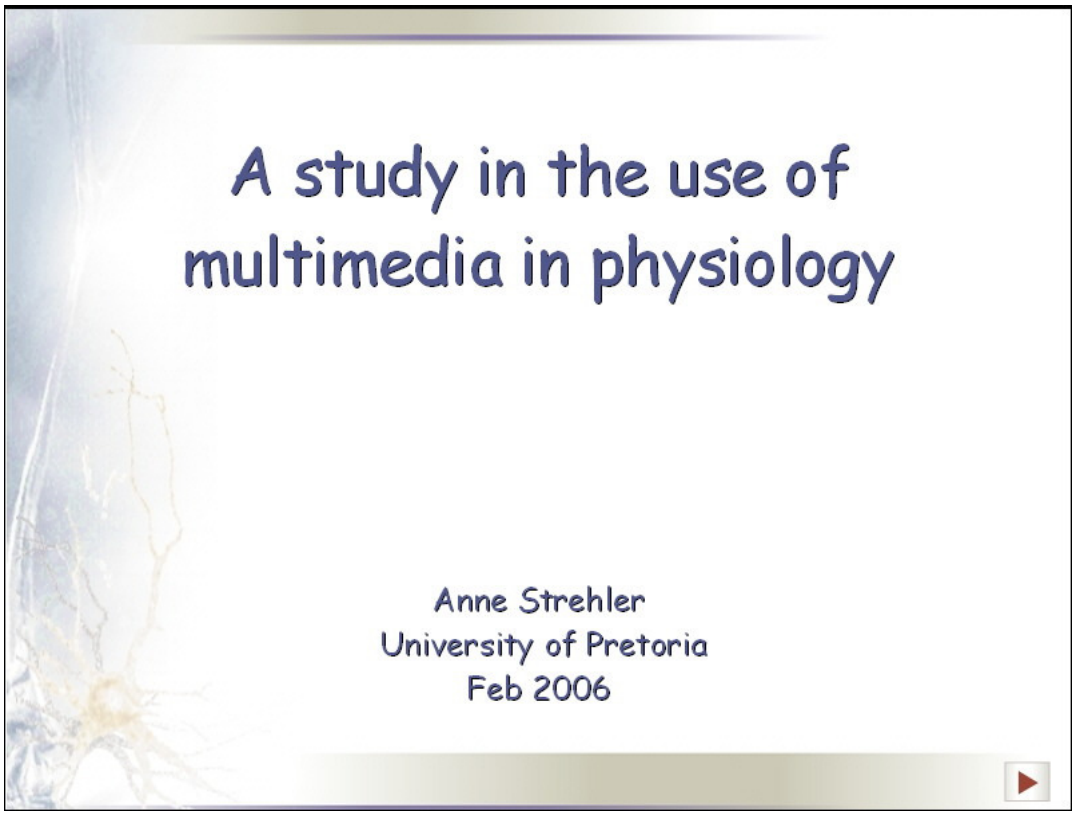
Question 11 on the reverse side of the page

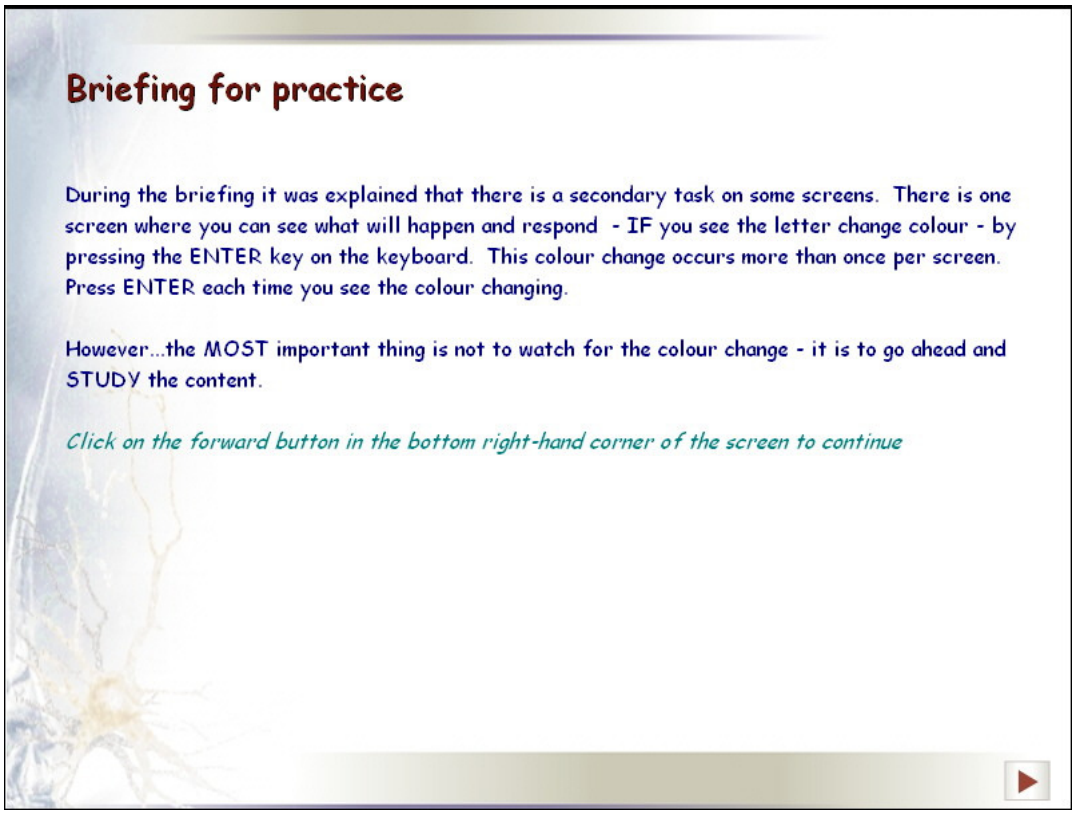
Question 11: You are assigned to the spinal unit during a clinical rotation. The rehabilitation of the paraplegic patients involves teaching them how to empty their bladder.

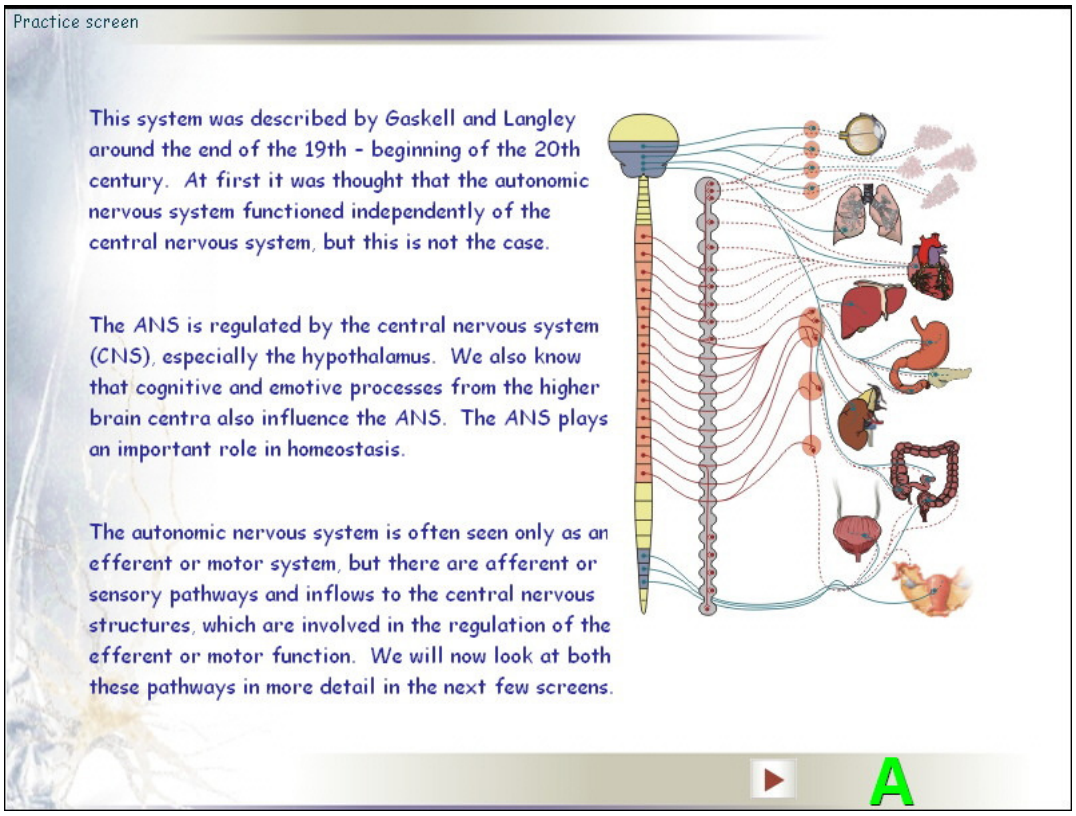
What neurological process makes this possible? [10]

Answer:

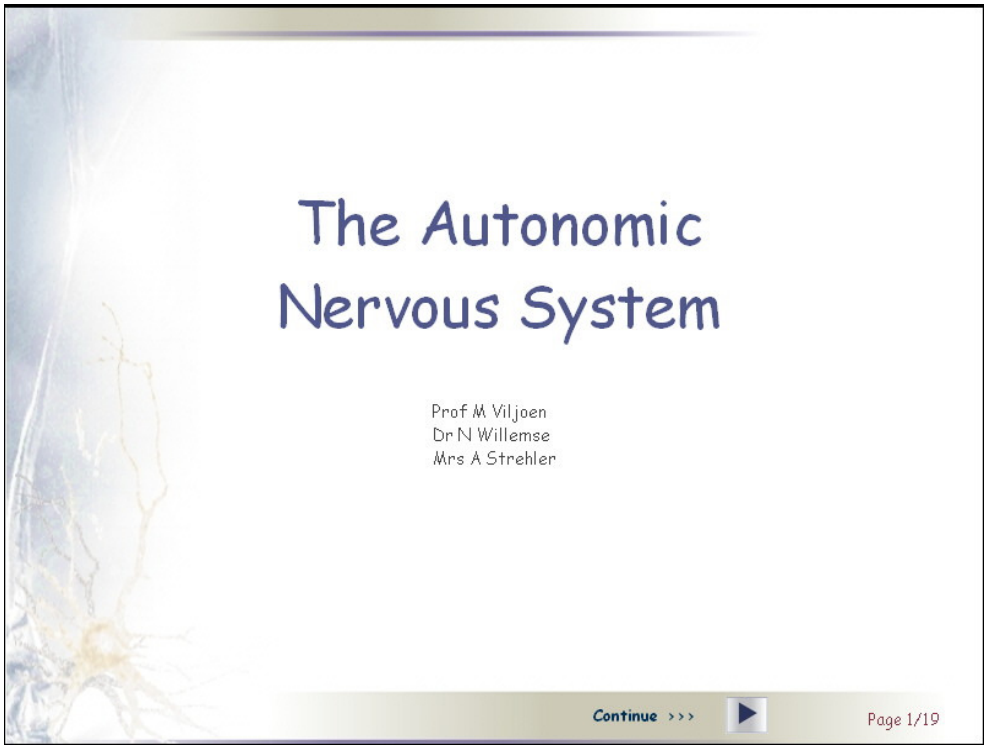
APPENDIX F: TITLE SCREEN AND PRACTICE SESSION SCREEN



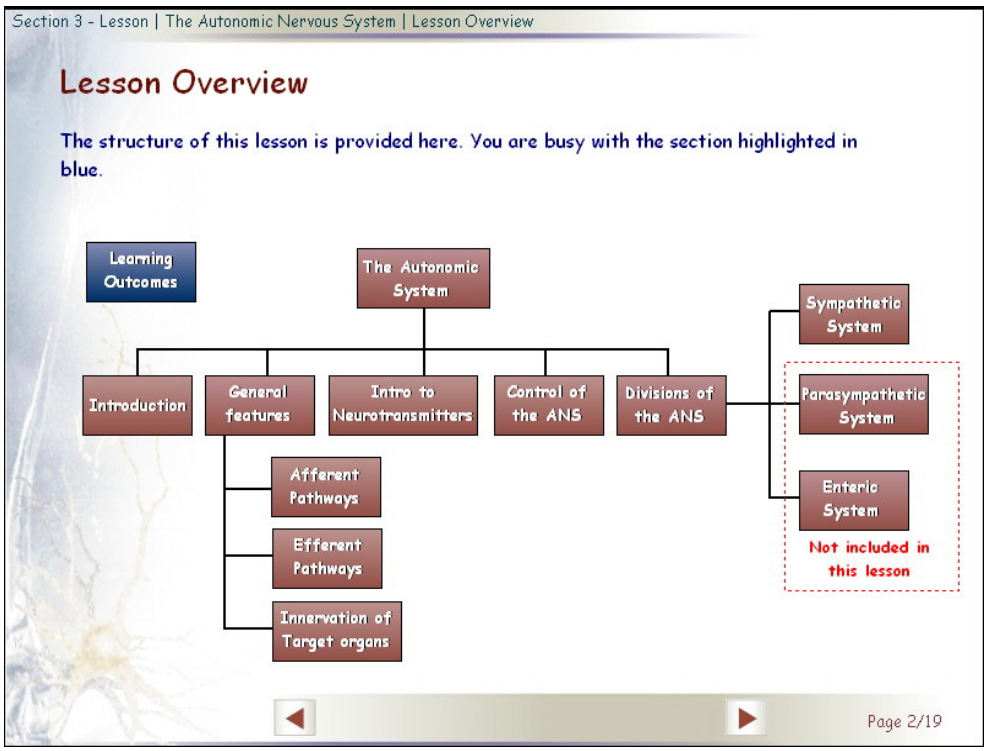



Practice screen
This system was described by Gaskell and Langley around the end of the 19th - beginning of the 20th century. At first it was thought that the autonomic nervous system functioned independently of the central nervous system, but this is not the case.
The ANS is regulated by the central nervous system (CNS), especially the hypothalamus. We also know that cognitive and emotive processes from the higher brain centra also influence the ANS. The ANS plays an important role in homeostasis.
The autonomic nervous system is often seen only as an efferent or motor system, but there are afferent or sensory pathways and inflows to the central nervous structures, which are involved in the regulation of the efferent or motor function. We will now look at both these pathways in more detail in the next few screens.
A

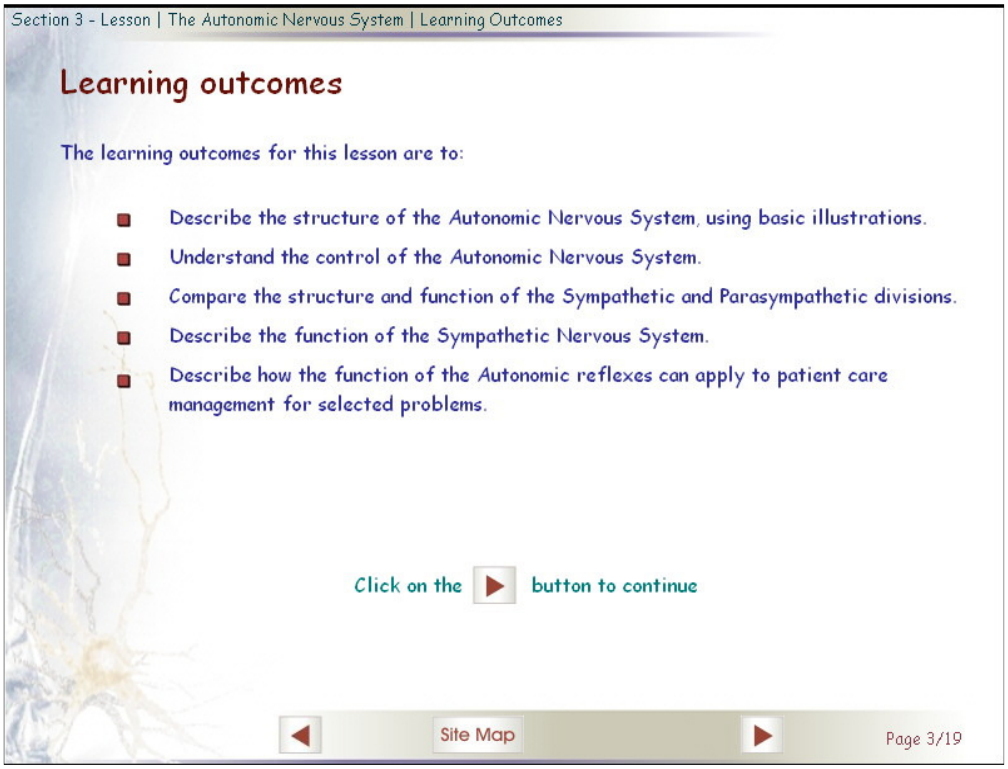
APPENDIX G: MULTIMEDIA INTERVENTION: SCREENS COMMON TO BOTH FORMATS



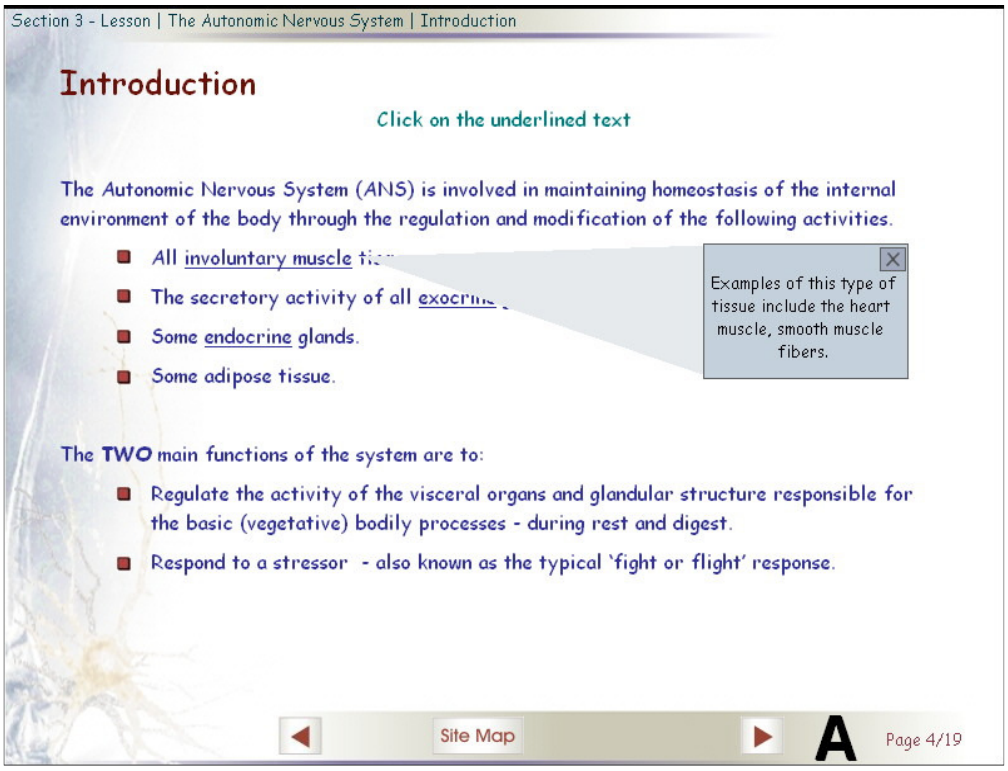
Animation version: Screen 1/19 and Static images & text version: Screen 1/23



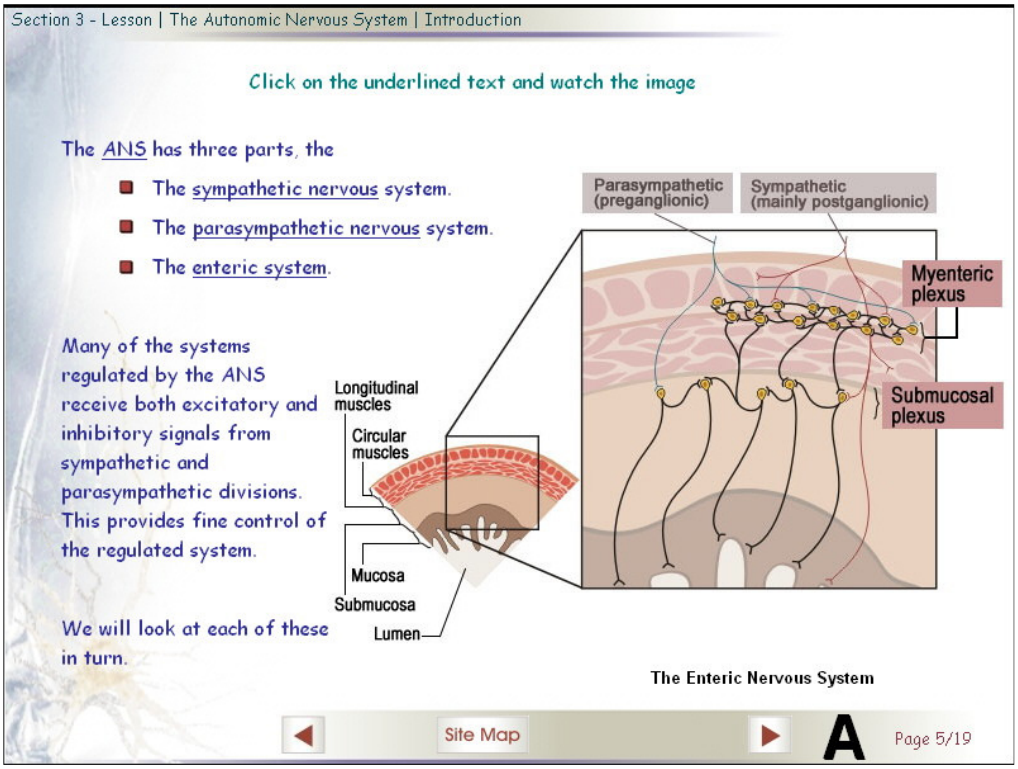
Animation version: Screen 2/19 and Static images & text version: Screen 2/23



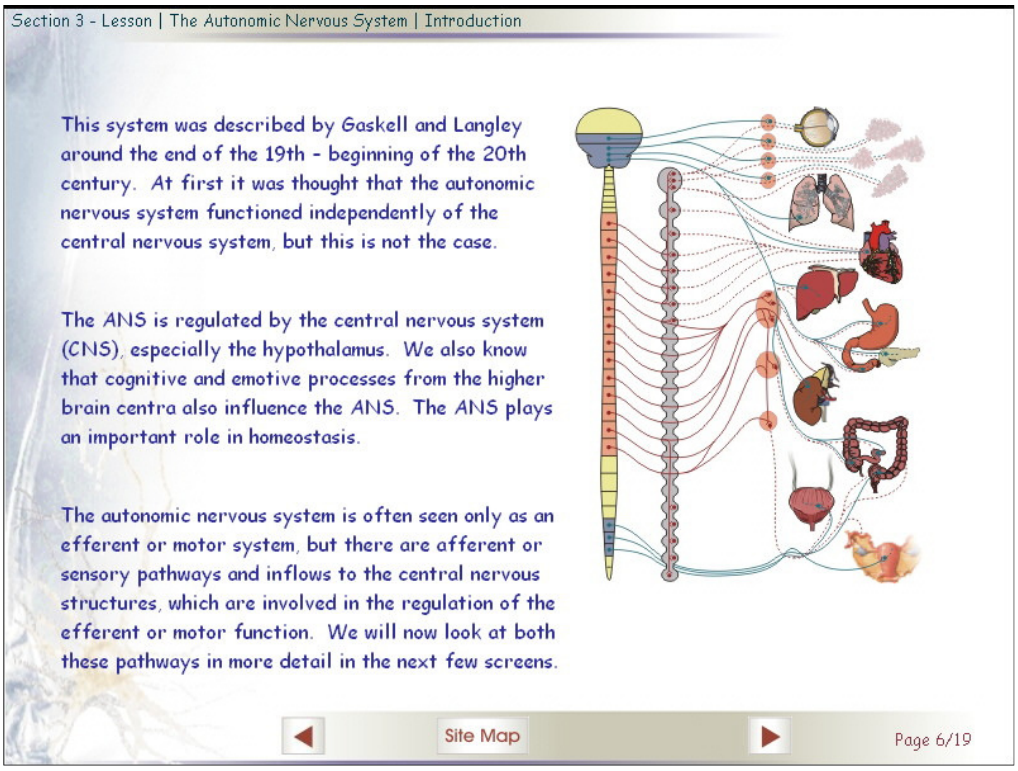
Animation version: Screen 3/19 and Static images & text version: Screen 3/23



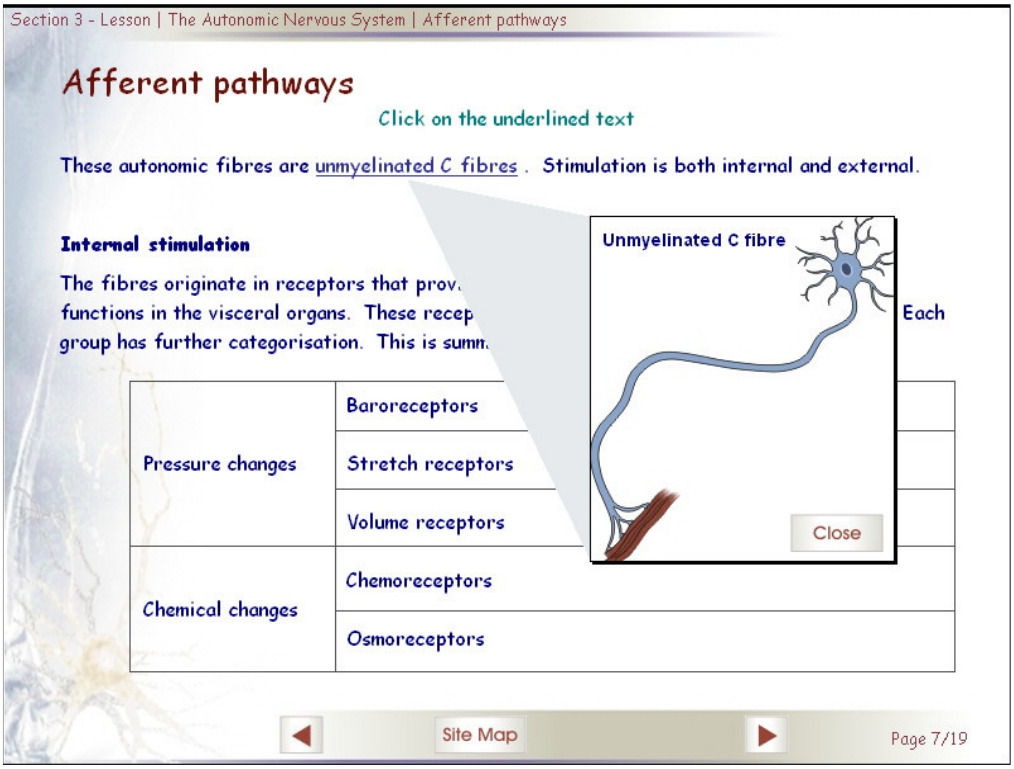
Animation version: Screen 4/19 and Static images & text version: Screen 4/23



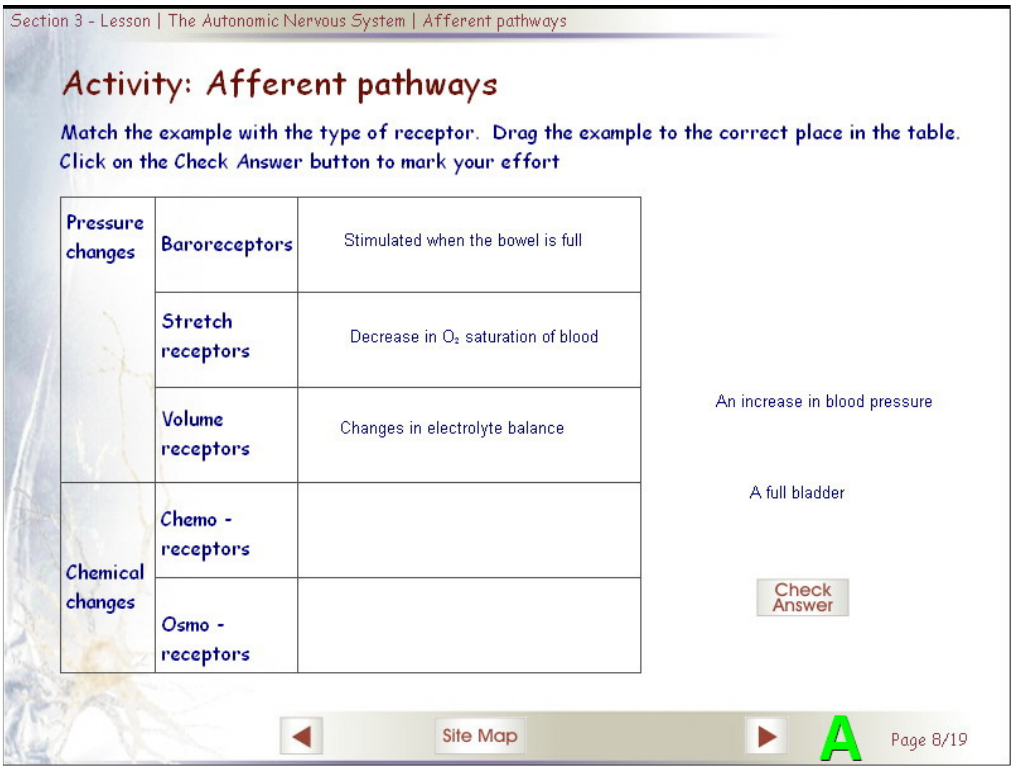
Animation version: Screen 5/19 and Static images & text version: Screen 5/23



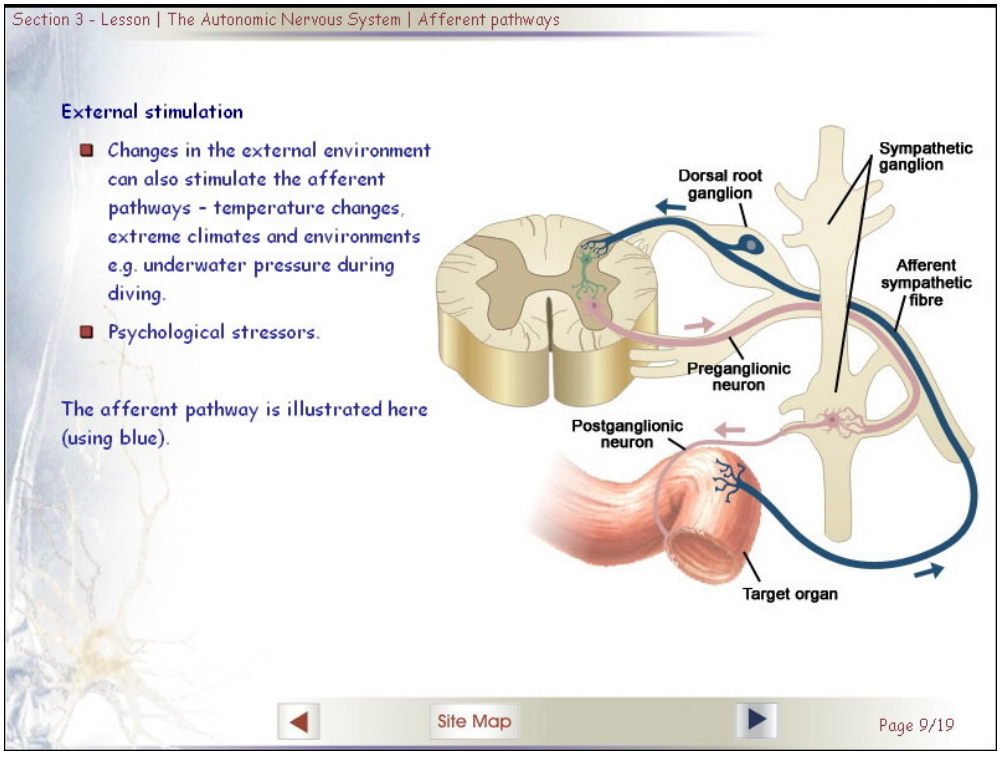
Animation version: Screen 6/19 and Static images & text version: Screen 6/23



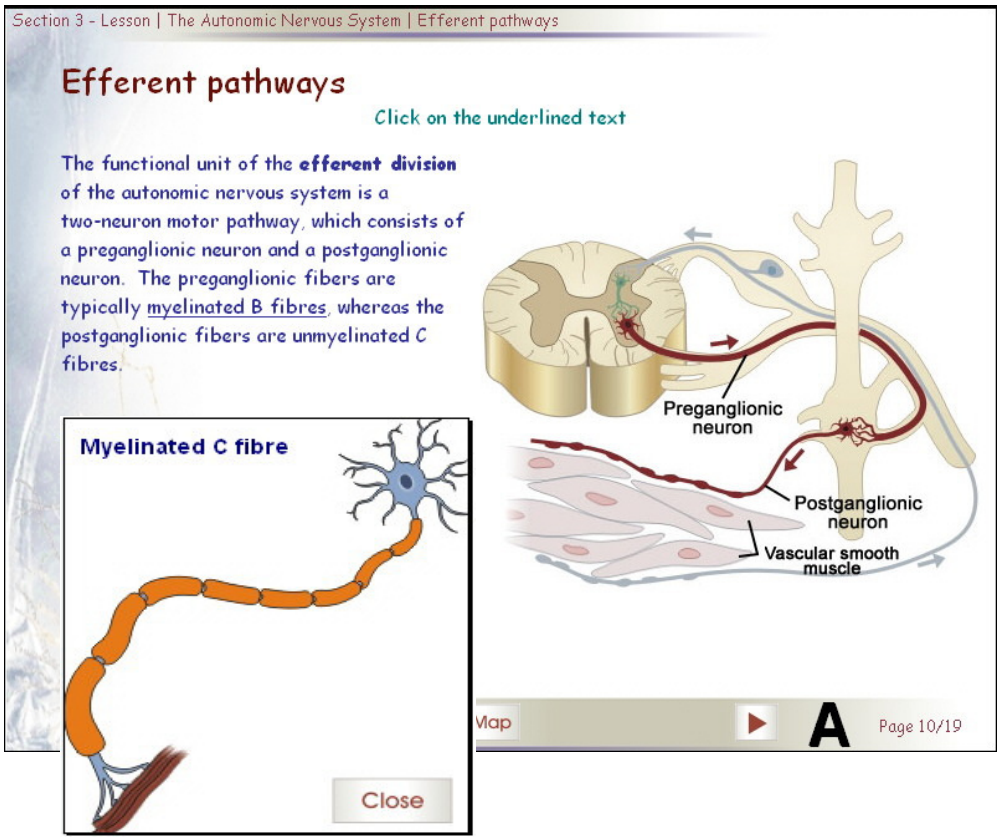
Animation version: Screen 7/19 and Static images & text version: Screen 7/23



Animation version: Screen 8/19 and Static images & text version: Screen 8/23



Animation version: Screen 9/19 and Static images & text version: Screen 9/23



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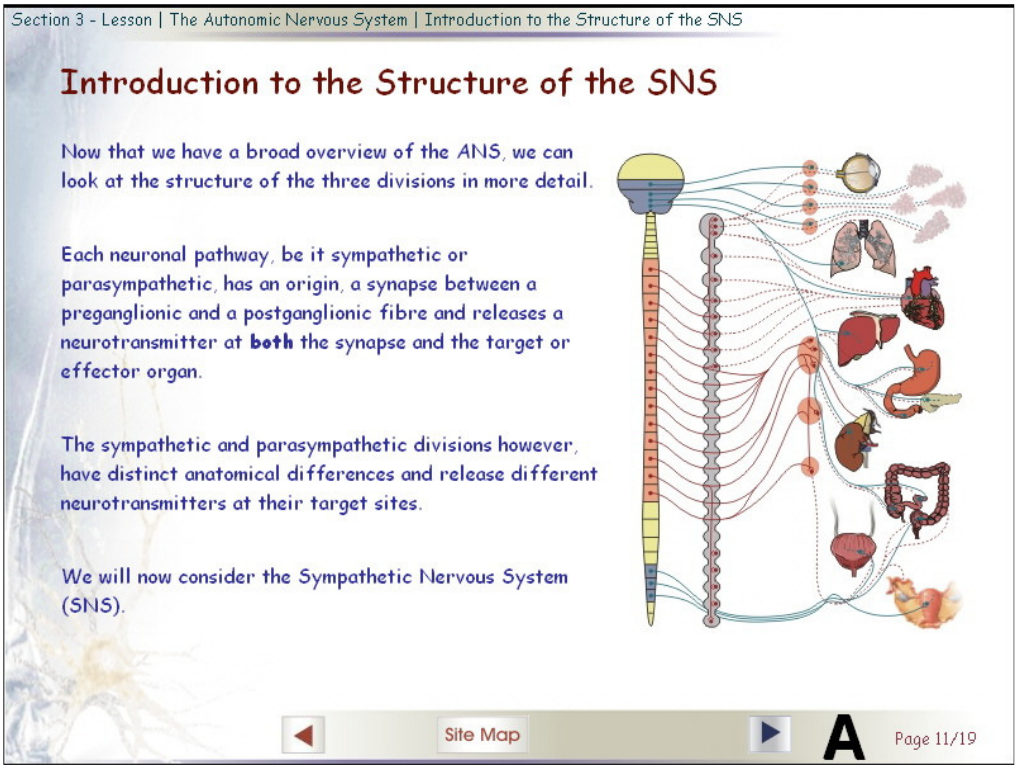
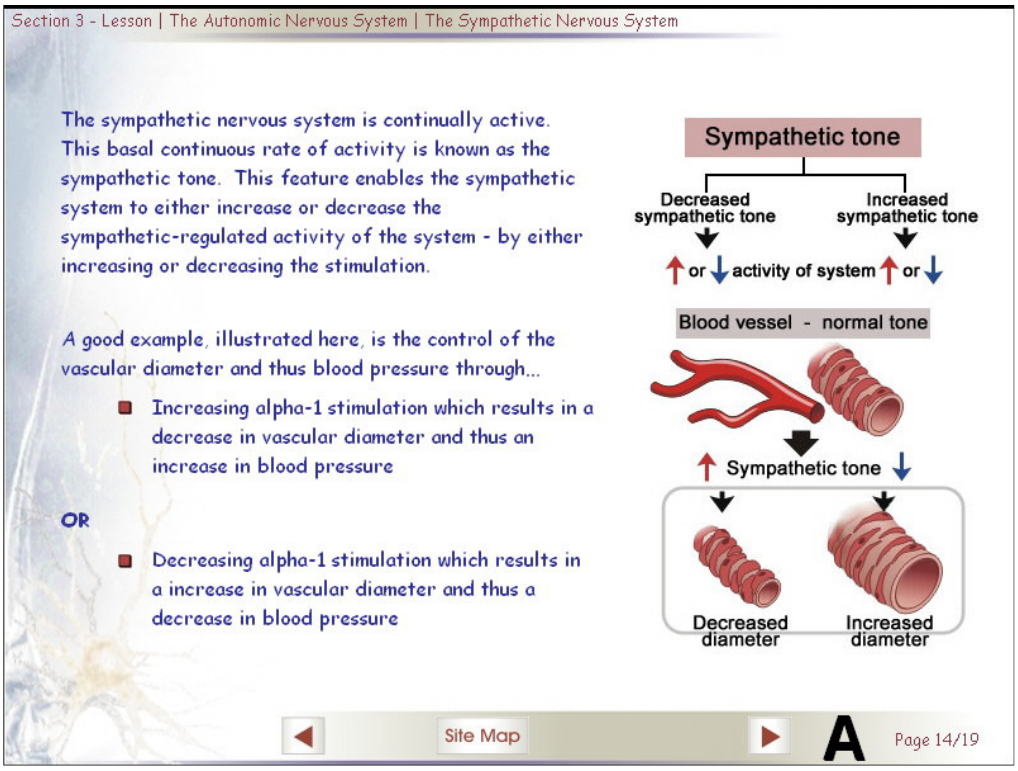


Animation version: Screen 11/19 and Static images & text version: Screen 11/23



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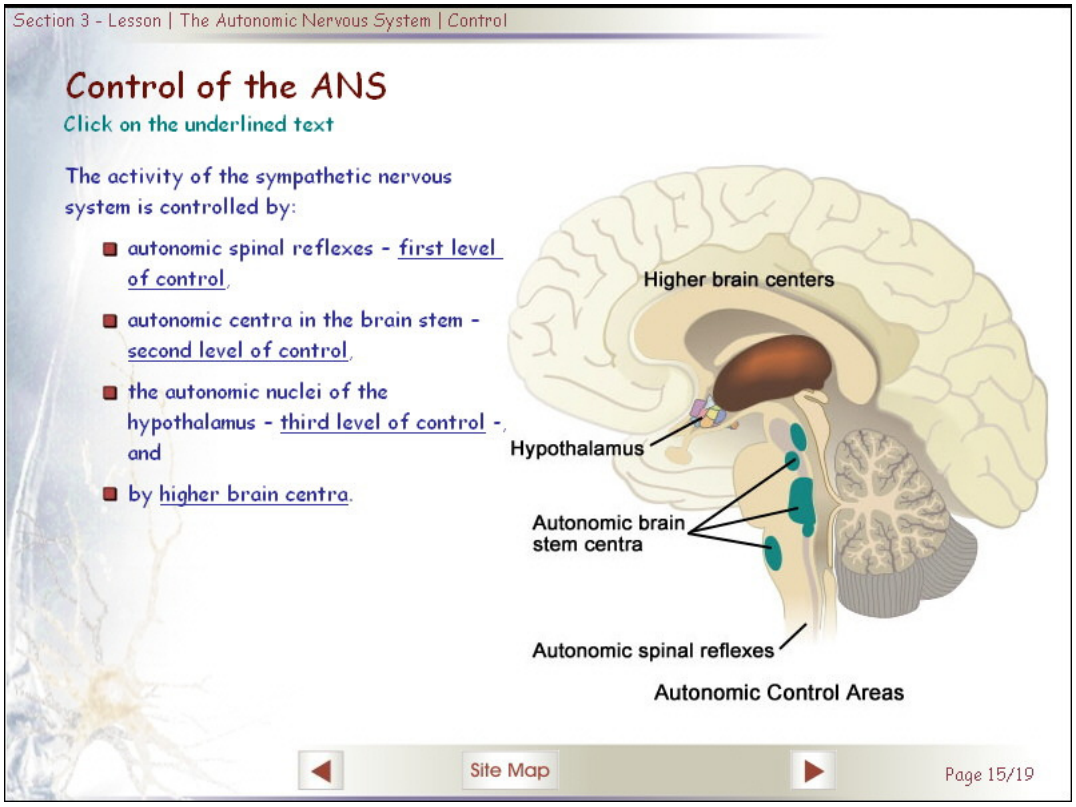
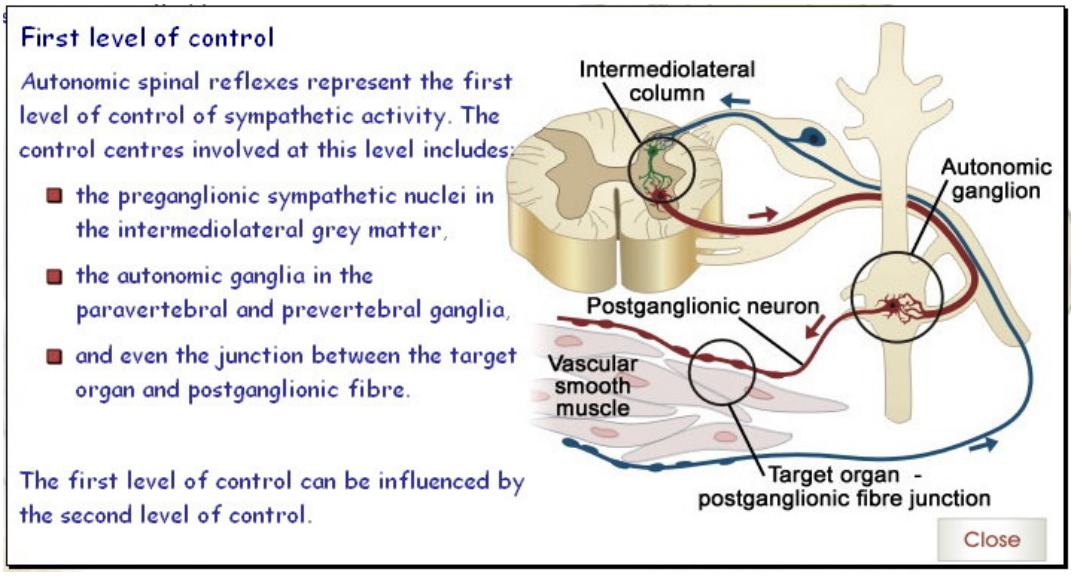


Animation version: Screen 15/19 and Static images & text version: Screen 22/23

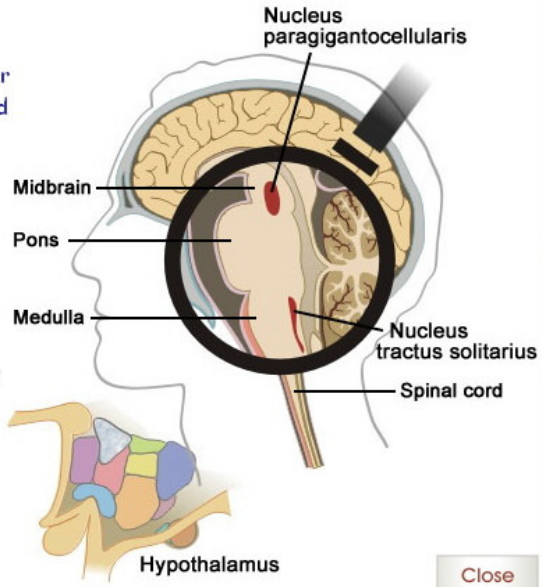


Second level of control

The second level of control, is the reticular formation in the brain stem and spinal cord that include the

- nucleus tractus solitarius, and the
- nucleus paragigantocellularis.

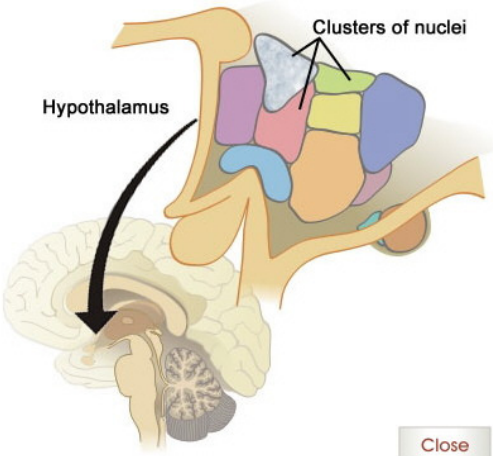
These autonomic centra of the midbrain, pons, medulla and spinal cord are in turn under the influence of the third level, that is, the hypothalamus.



Close

Third level of control

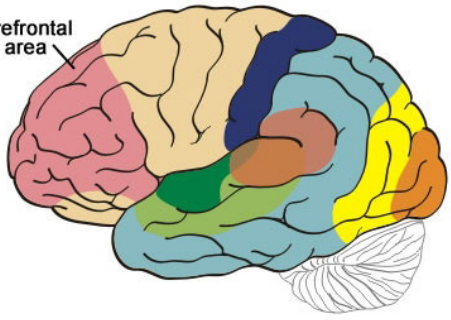
The autonomic nuclei of the hypothalamus represents the third level of control. The hypothalamus can in a sense be seen as the head autonomic ganglion and consists of clusters of nuclei that control endocrine and autonomic nervous system function. The hypothalamus can, however, be influenced by the higher brain centra.



Close

Control by higher brain

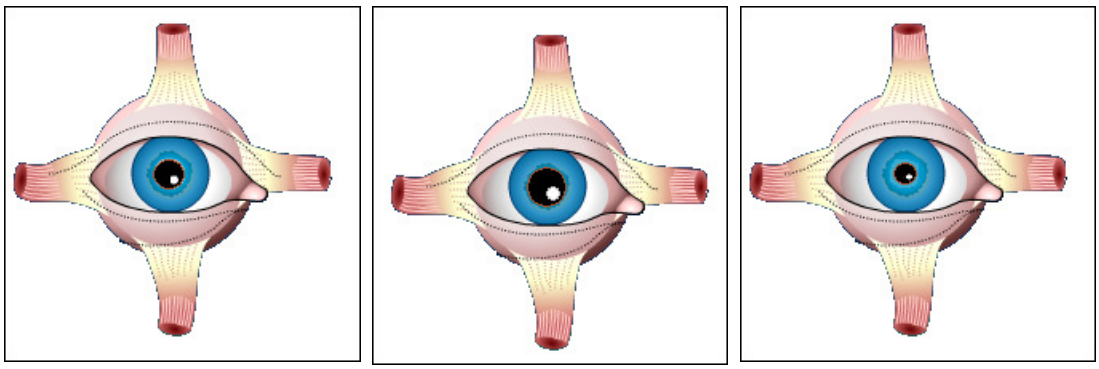
Higher brain centres can influence autonomic control by the hypothalamus and brain stem through descending tracts associated with the paraventricular nucleus, the central noradrenergic system, the raphe nuclei and others. Cognitive and emotional events can in this way alter sympathetic activity and chronic stress can through conditions of sustained sympathetic stimulation even shorten the life time of humans and animals.



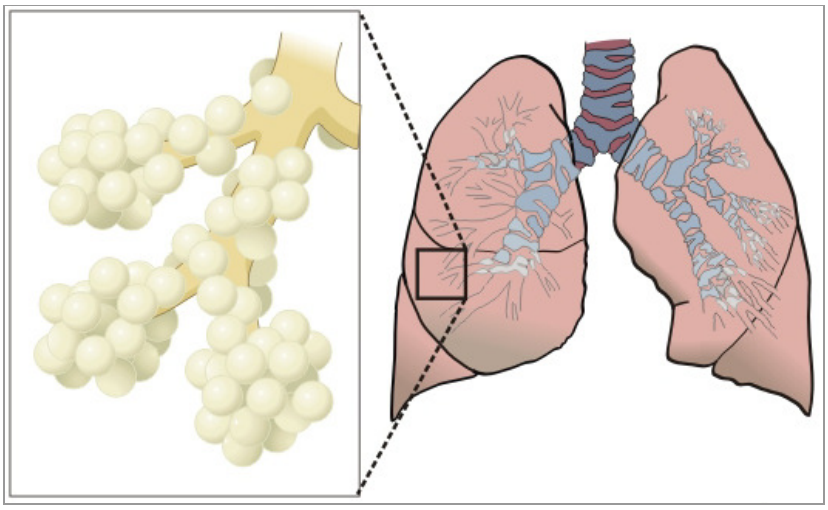
The degree to which external and cortico-limbic inputs activate the sympathetic system is largely determined by the individual's perception of the situation, which is often a function of previous experience and conditioning.

Close

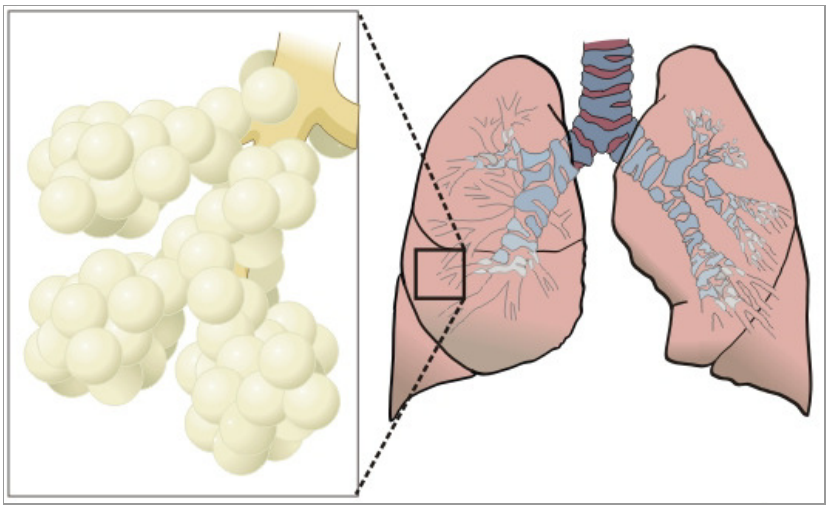
Animation version: Screen 17/19 and Static images & text version: Screen xx/23 – opening view



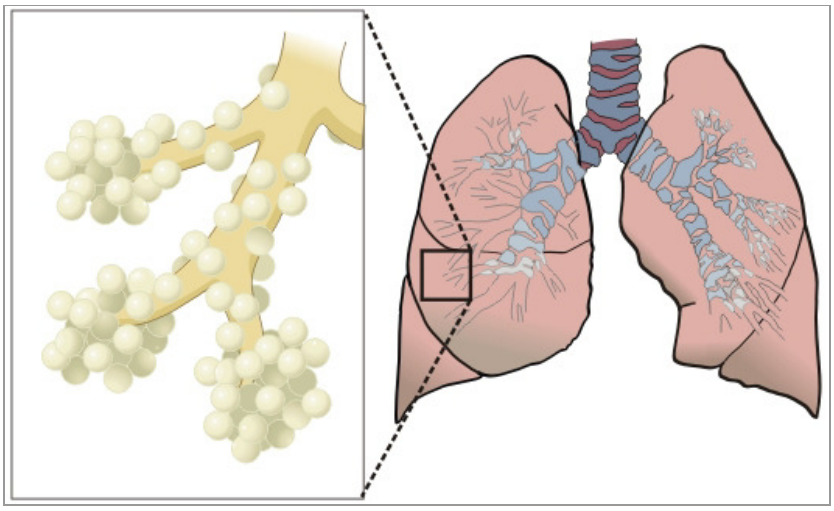
Three views of the innervation of the eye



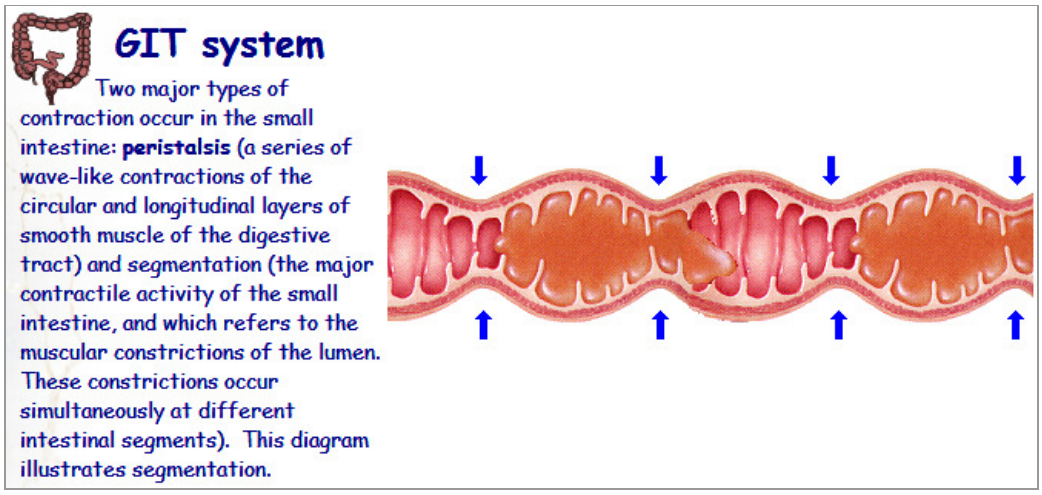
First view of the lung



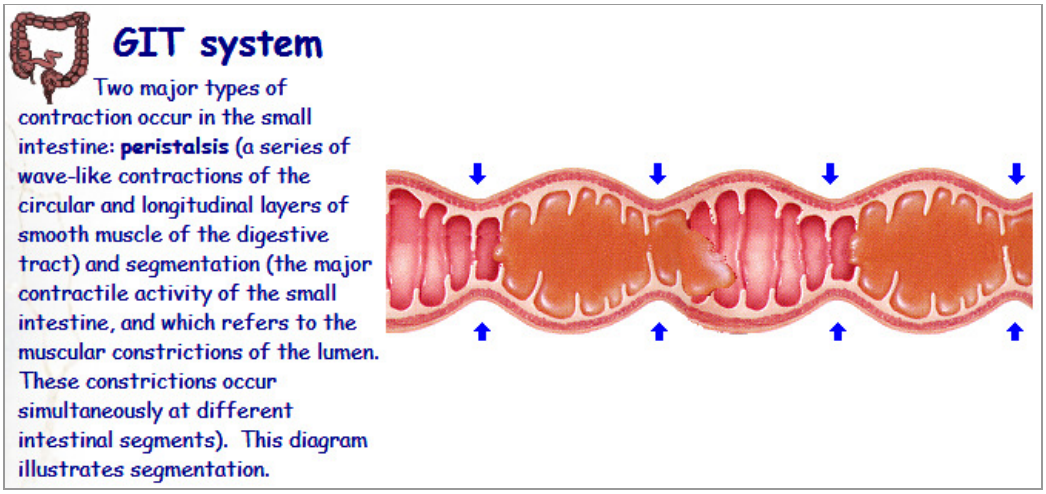
Innervation by the Sympathetic Nervous System



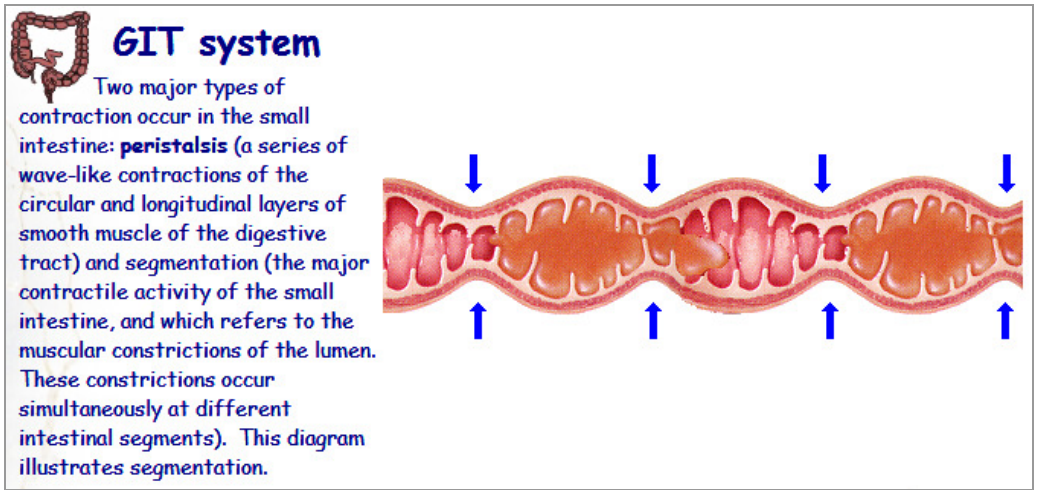
Innervation by the Parasympathetic Nervous System



First view of the GIT system



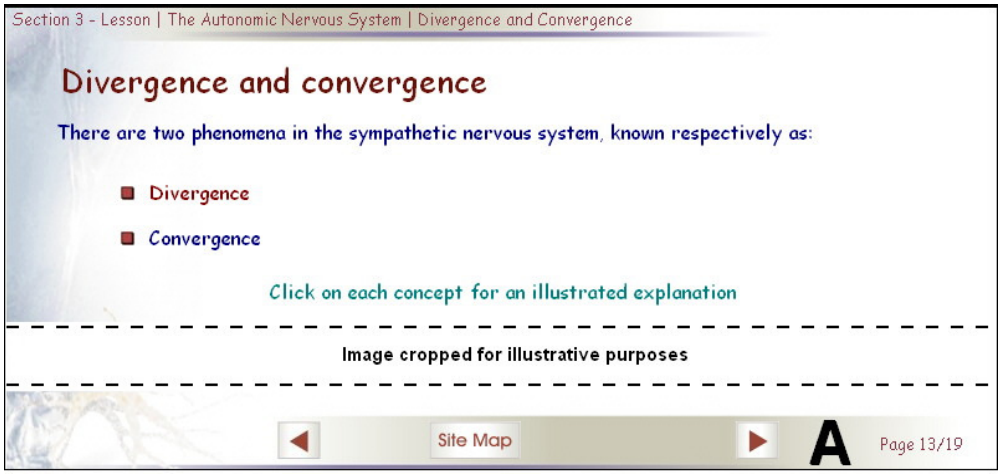
Innervation by the Sympathetic Nervous System

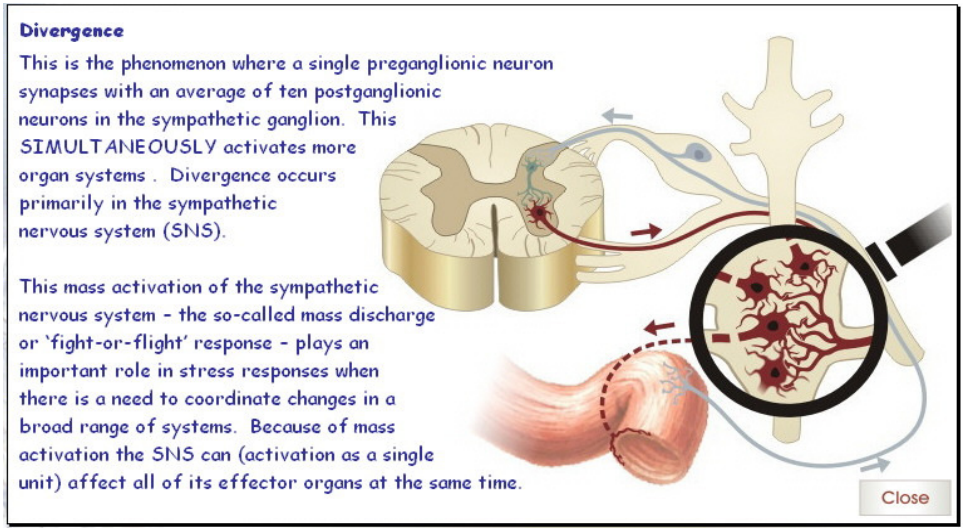


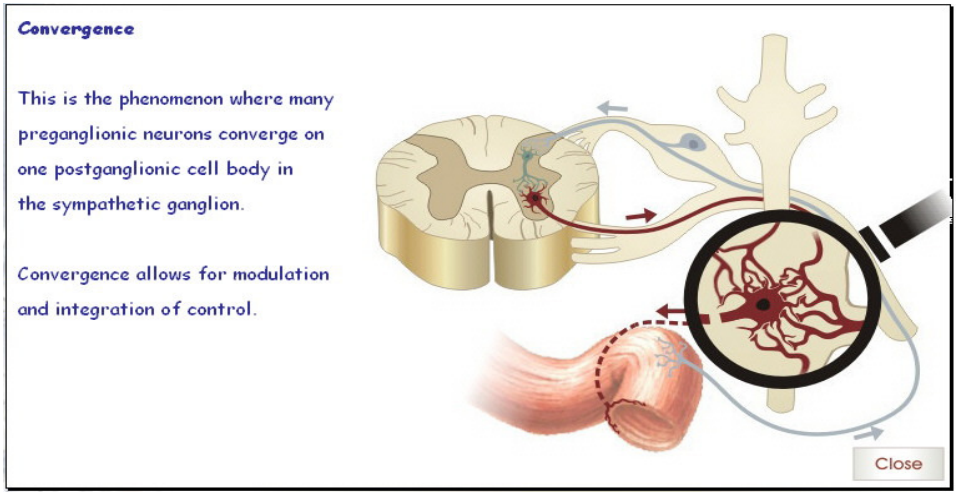
Innervation by the Parasympathetic Nervous System

APPENDIX H: MULTIMEDIA INTERVENTION: DIFFERENT STRATEGIES TO DISPLAY SAME CONTENT

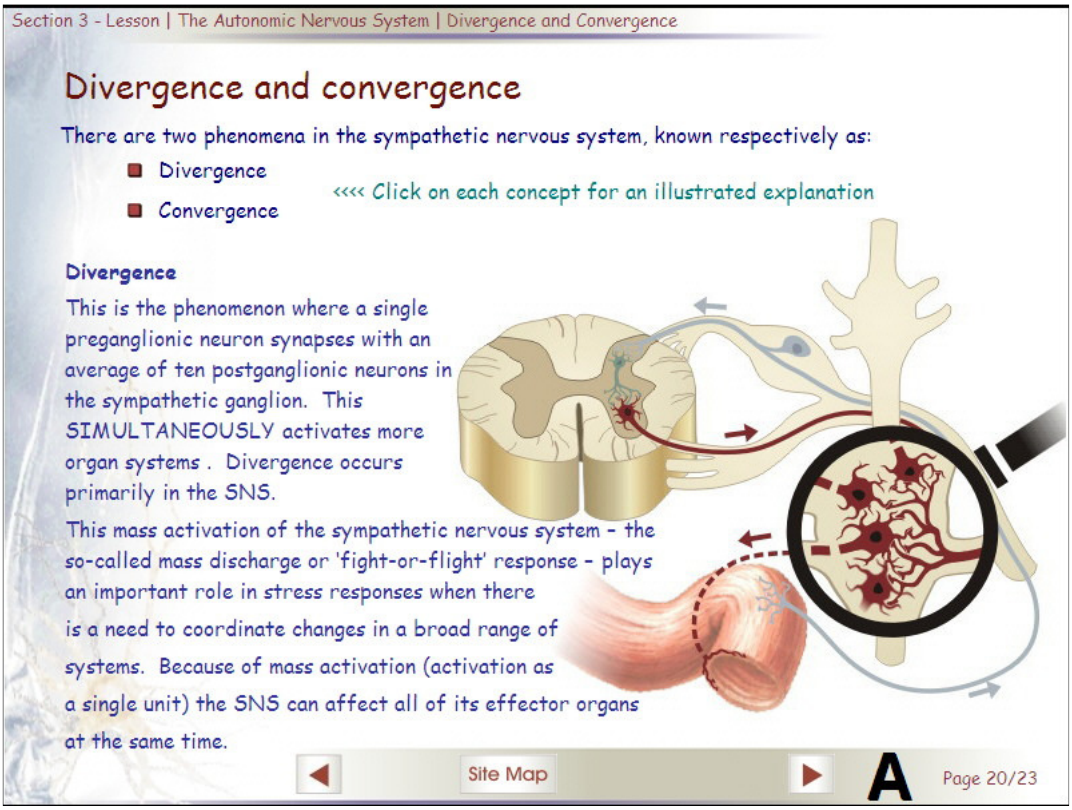
Animation version – Screen 13

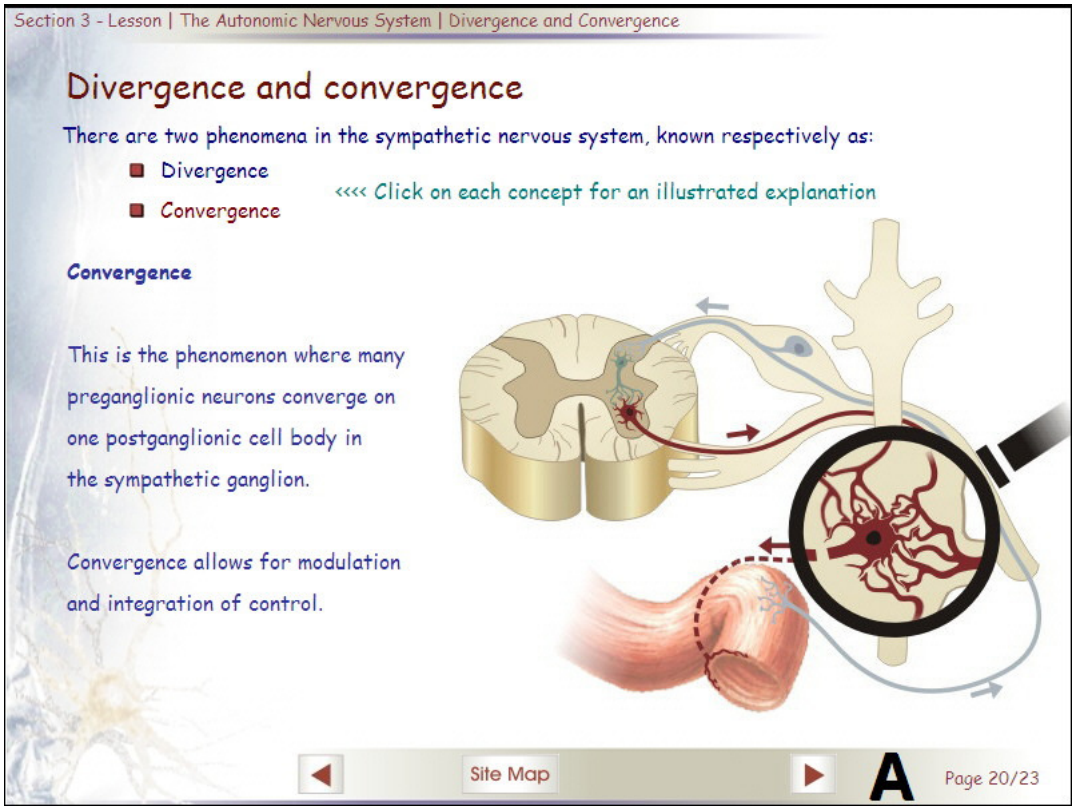






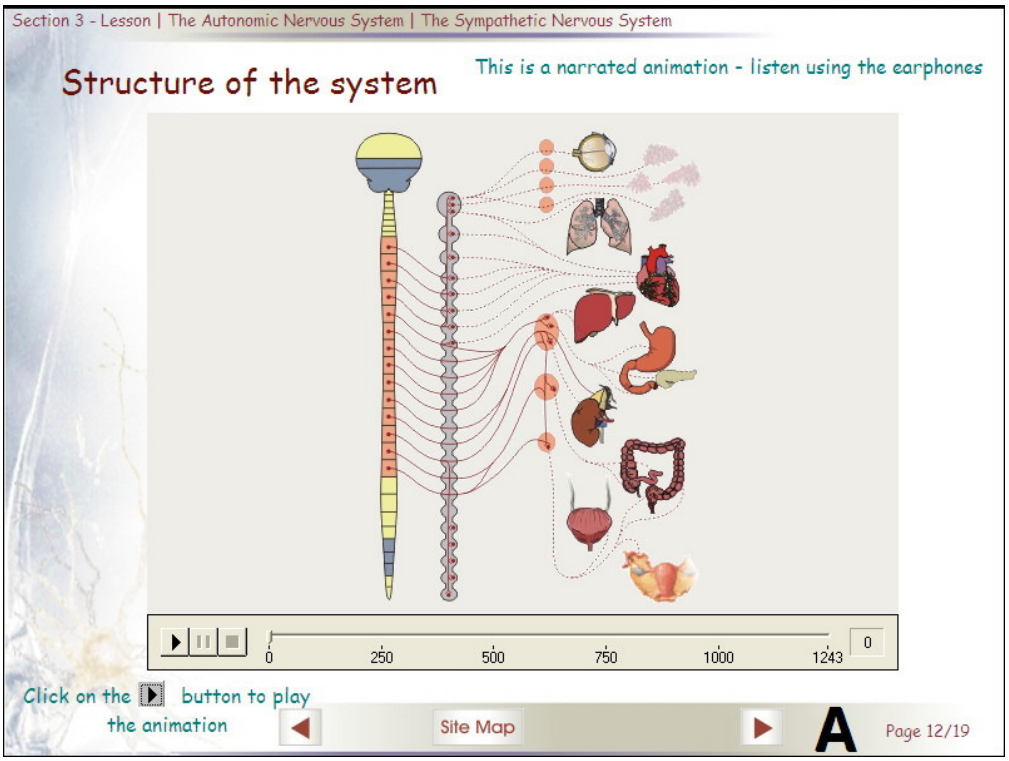
Static images & text version – Screen 20



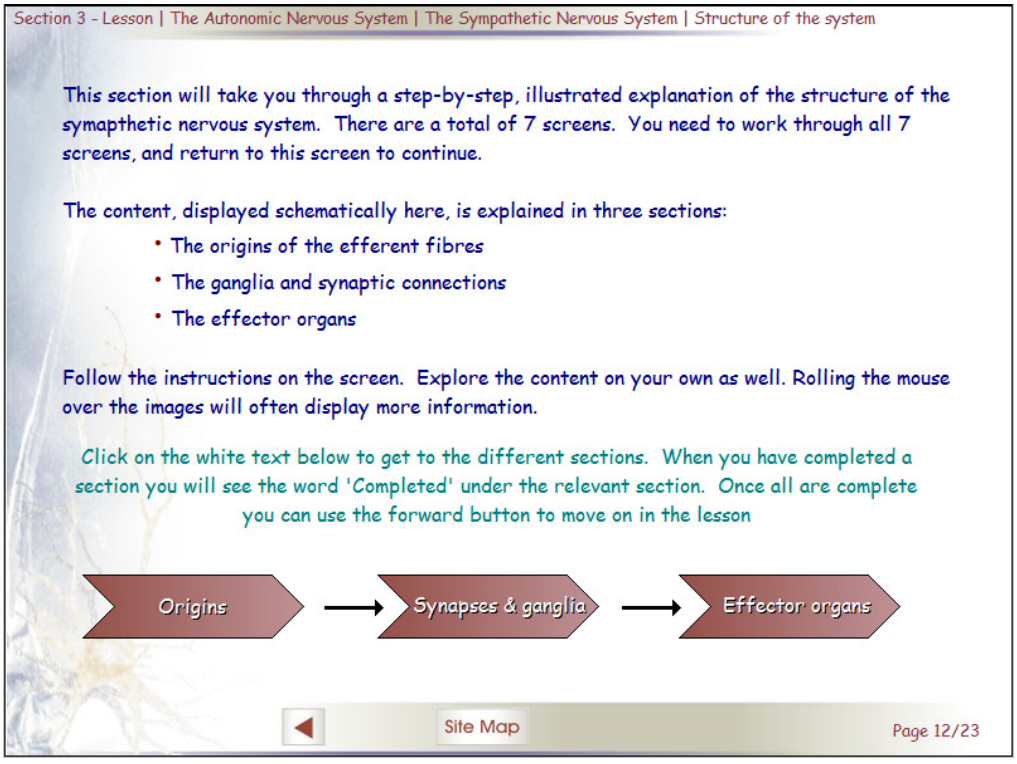


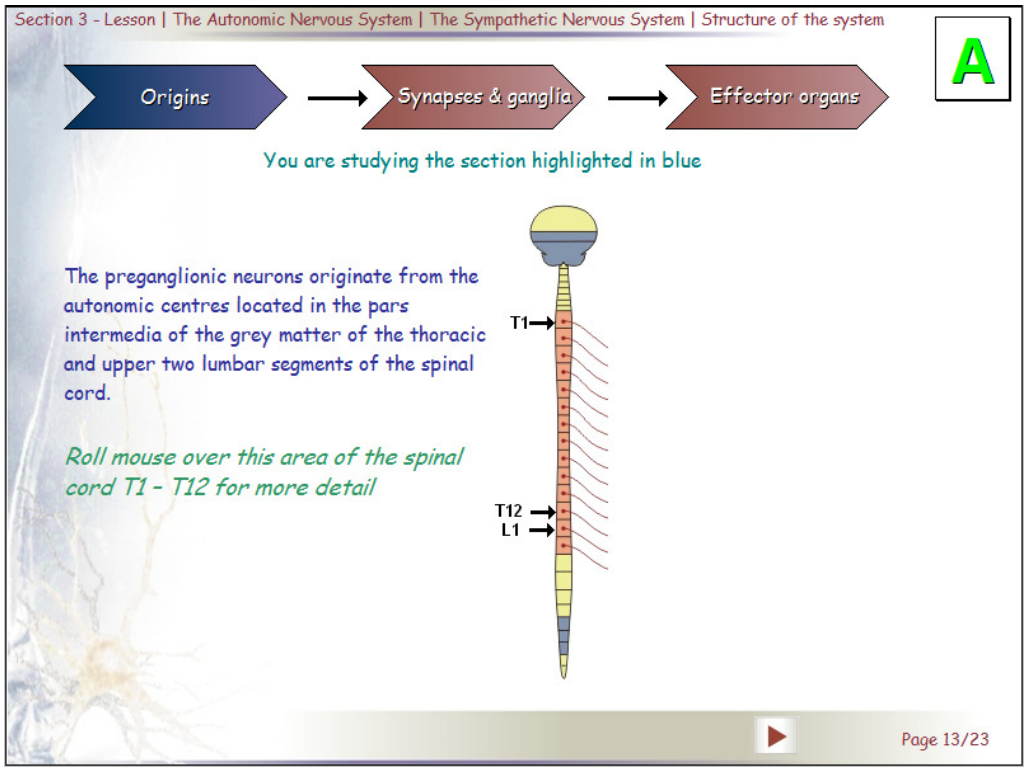
APPENDIX I: MULTIMEDIA: ANIMATION VERSUS STATIC IMAGES

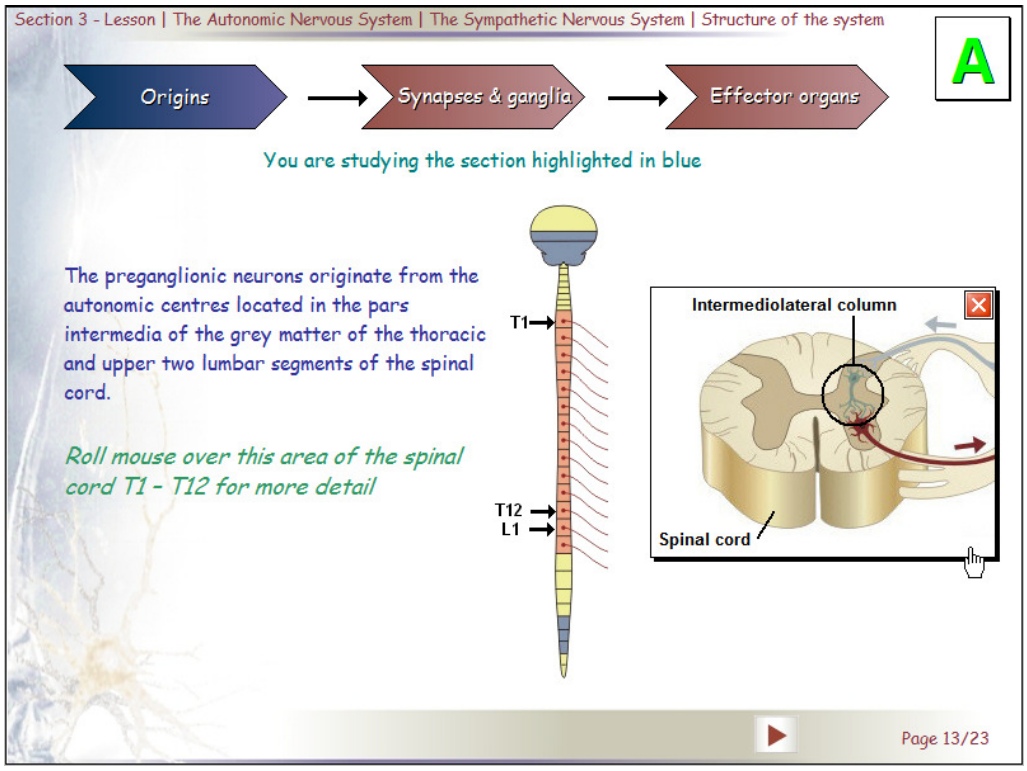
Animation version: Screen 12 (Animation)

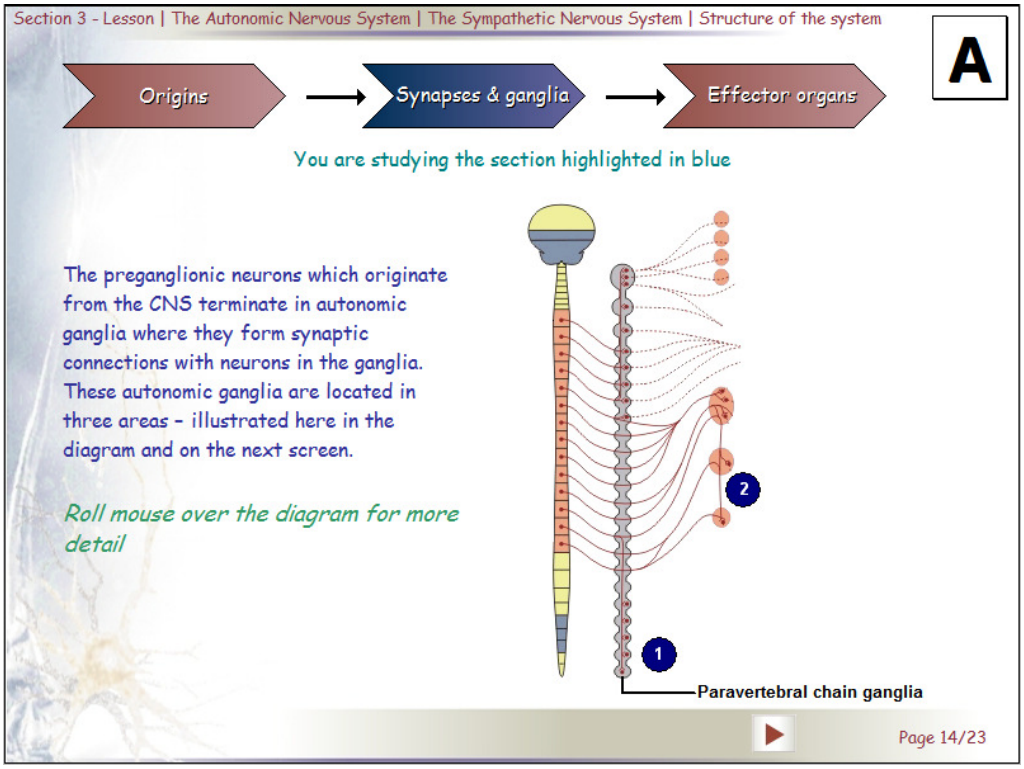


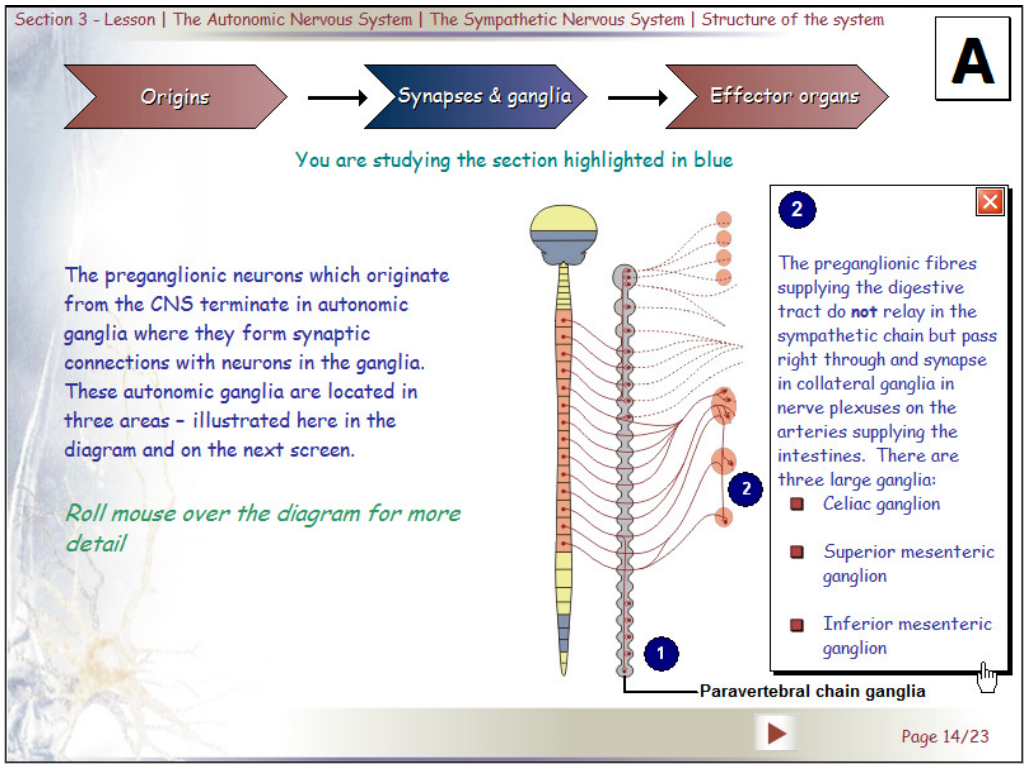
Static images & text version: Screens 12 – 16

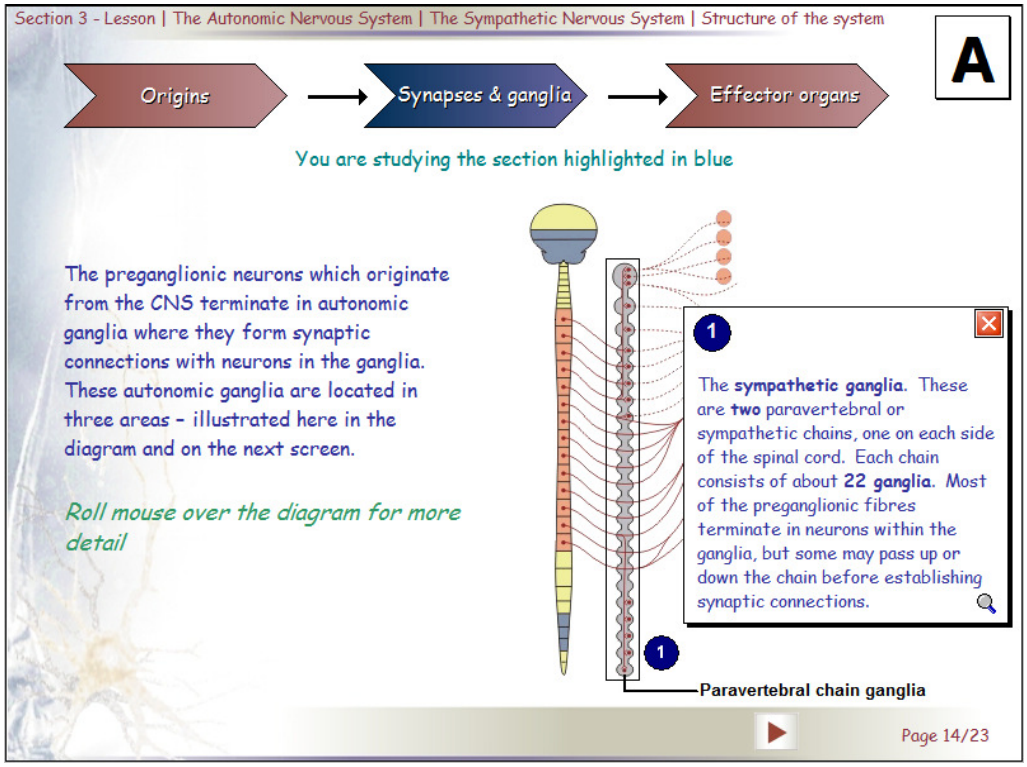


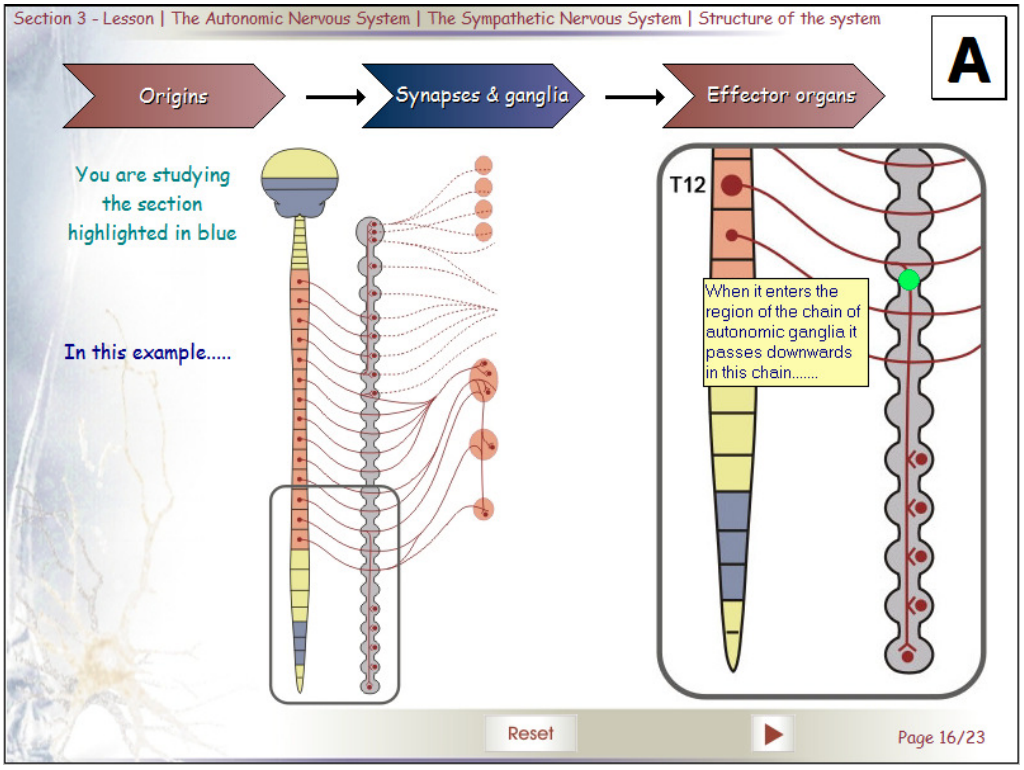

Section 3 - Lesson | The Autonomic Nervous System | The Sympathetic Nervous System | Structure of the system
A
Origins
Synapses & ganglia
Effector organs
You are studying the section highlighted in blue
The preganglionic neurons originate from the autonomic centres located in the pars intermedia of the grey matter of the thoracic and upper two lumbar segments of the spinal cord.
Roll mouse over this area of the spinal cord T1 - T12 for more detail
T1
T12
L1
Page 13/23

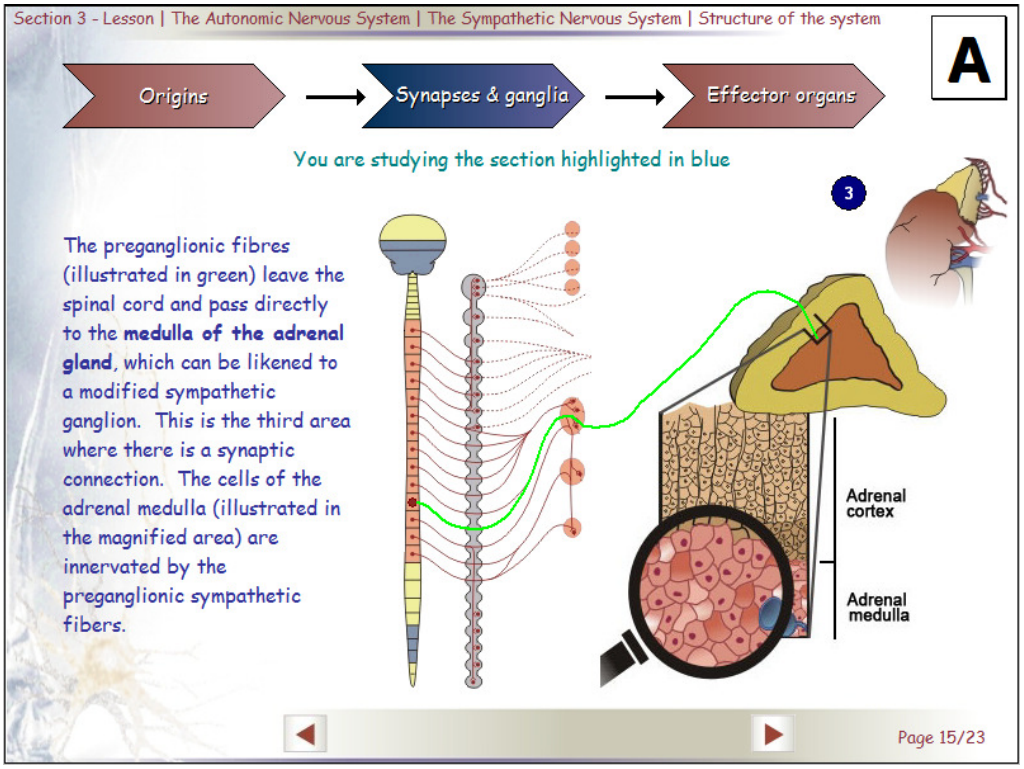

Section 3 - Lesson | The Autonomic Nervous System | The Sympathetic Nervous System | Structure of the system
A
Origins
Synapses & ganglia
Effector organs
You are studying the section highlighted in blue
The preganglionic neurons originate from the autonomic centres located in the pars intermedia of the grey matter of the thoracic and upper two lumbar segments of the spinal cord.
Roll mouse over this area of the spinal cord T1 - T12 for more detail
T1
T12
L1
Intermediolateral column
Spinal cord
Page 13/23

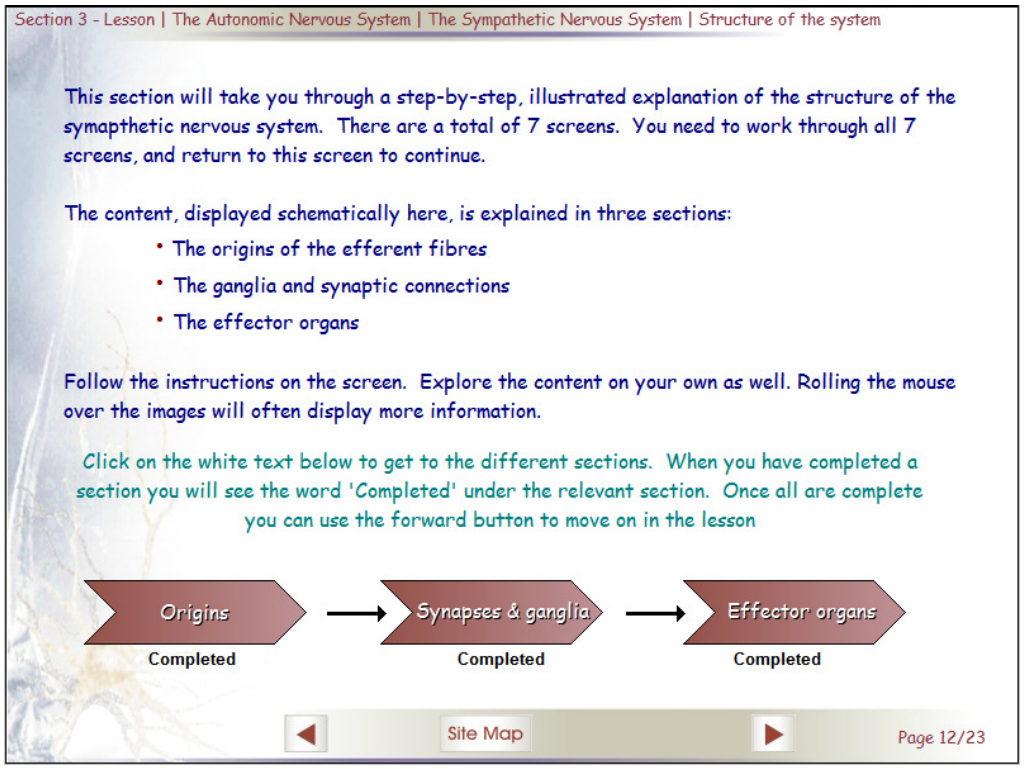

Section 3 - Lesson | The Autonomic Nervous System | The Sympathetic Nervous System | Structure of the system
A
Origins
Synapses & ganglia
Effector organs
You are studying the section highlighted in blue
The preganglionic neurons which originate from the CNS terminate in autonomic ganglia where they form synaptic connections with neurons in the ganglia. These autonomic ganglia are located in three areas – illustrated here in the diagram and on the next screen.
Roll mouse over the diagram for more detail
1
2
Paravertebral chain ganglia
Page 14/23


Section 3 - Lesson | The Autonomic Nervous System | The Sympathetic Nervous System | Structure of the system
A
Origins
Synapses & ganglia
Effector organs
You are studying the section highlighted in blue
The preganglionic neurons which originate from the CNS terminate in autonomic ganglia where they form synaptic connections with neurons in the ganglia. These autonomic ganglia are located in three areas – illustrated here in the diagram and on the next screen.
Roll mouse over the diagram for more detail
2
The preganglionic fibres supplying the digestive tract do **not** relay in the sympathetic chain but pass right through and synapse in collateral ganglia in nerve plexuses on the arteries supplying the intestines. There are three large ganglia:
Celiac ganglion
Superior mesenteric ganglion
Inferior mesenteric ganglion
1
2
Paravertebral chain ganglia
Page 14/23


Section 3 - Lesson | The Autonomic Nervous System | The Sympathetic Nervous System | Structure of the system
A
Origins
Synapses & ganglia
Effector organs
You are studying the section highlighted in blue
The preganglionic neurons which originate from the CNS terminate in autonomic ganglia where they form synaptic connections with neurons in the ganglia. These autonomic ganglia are located in three areas – illustrated here in the diagram and on the next screen.
Roll mouse over the diagram for more detail
1
The sympathetic ganglia. These are two paravertebral or sympathetic chains, one on each side of the spinal cord. Each chain consists of about 22 ganglia. Most of the preganglionic fibres terminate in neurons within the ganglia, but some may pass up or down the chain before establishing synaptic connections.
1
Paravertebral chain ganglia
Page 14/23

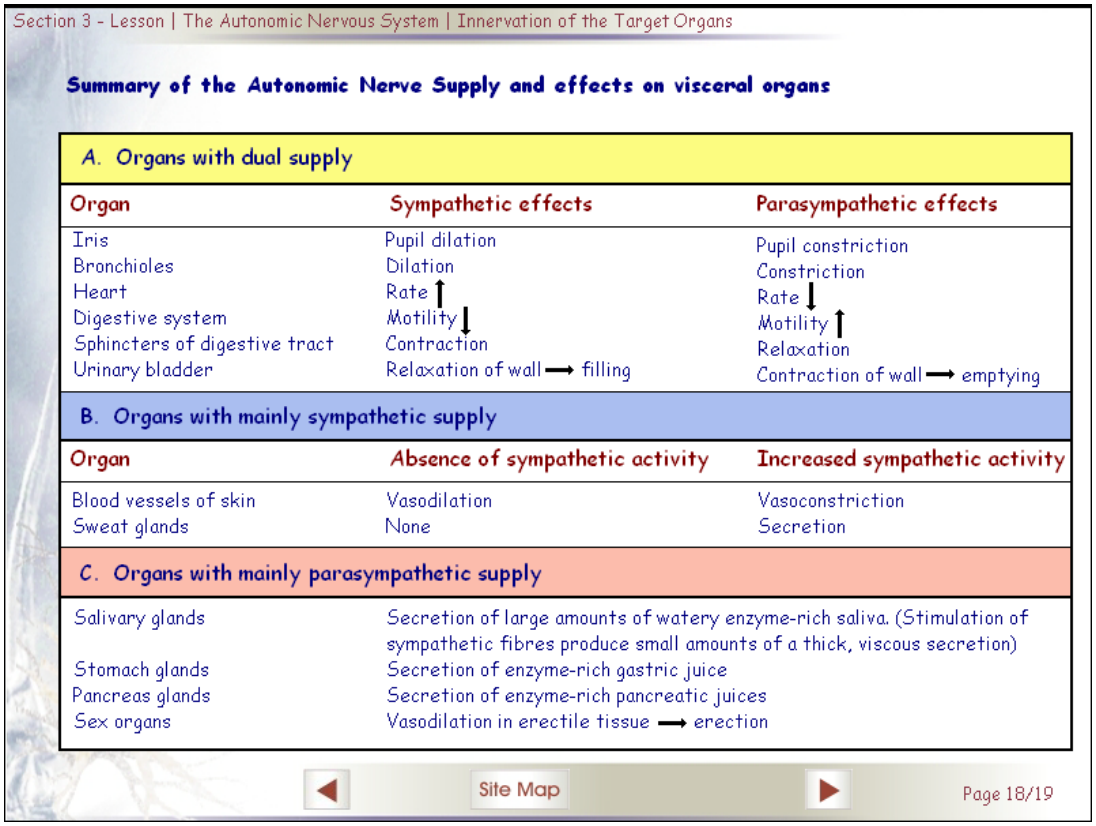

Section 3 - Lesson | The Autonomic Nervous System | The Sympathetic Nervous System | Structure of the system
A
Origins
Synapses & ganglia
Effector organs
You are studying the section highlighted in blue
In this example.....
T12
When it enters the region of the chain of autonomic ganglia it passes downwards in this chain.....
Reset
Page 16/23


Section 3 - Lesson | The Autonomic Nervous System | The Sympathetic Nervous System | Structure of the system
A
Origins
Synapses & ganglia
Effector organs
You are studying the section highlighted in blue
3
The preganglionic fibres (illustrated in green) leave the spinal cord and pass directly to the **medulla of the adrenal gland**, which can be likened to a modified sympathetic ganglion. This is the third area where there is a synaptic connection. The cells of the adrenal medulla (illustrated in the magnified area) are innervated by the preganglionic sympathetic fibers.
Adrenal cortex
Adrenal medulla
Page 15/23


Section 3 - Lesson | The Autonomic Nervous System | The Sympathetic Nervous System | Structure of the system
This section will take you through a step-by-step, illustrated explanation of the structure of the symapthetic nervous system. There are a total of 7 screens. You need to work through all 7 screens, and return to this screen to continue.
The content, displayed schematically here, is explained in three sections:
• The origins of the efferent fibres
• The ganglia and synaptic connections
• The effector organs
Follow the instructions on the screen. Explore the content on your own as well. Rolling the mouse over the images will often display more information.
Click on the white text below to get to the different sections. When you have completed a section you will see the word 'Completed' under the relevant section. Once all are complete you can use the forward button to move on in the lesson
Origins
Completed
Synapses & ganglia
Completed
Effector organs
Completed
Site Map
Page 12/23

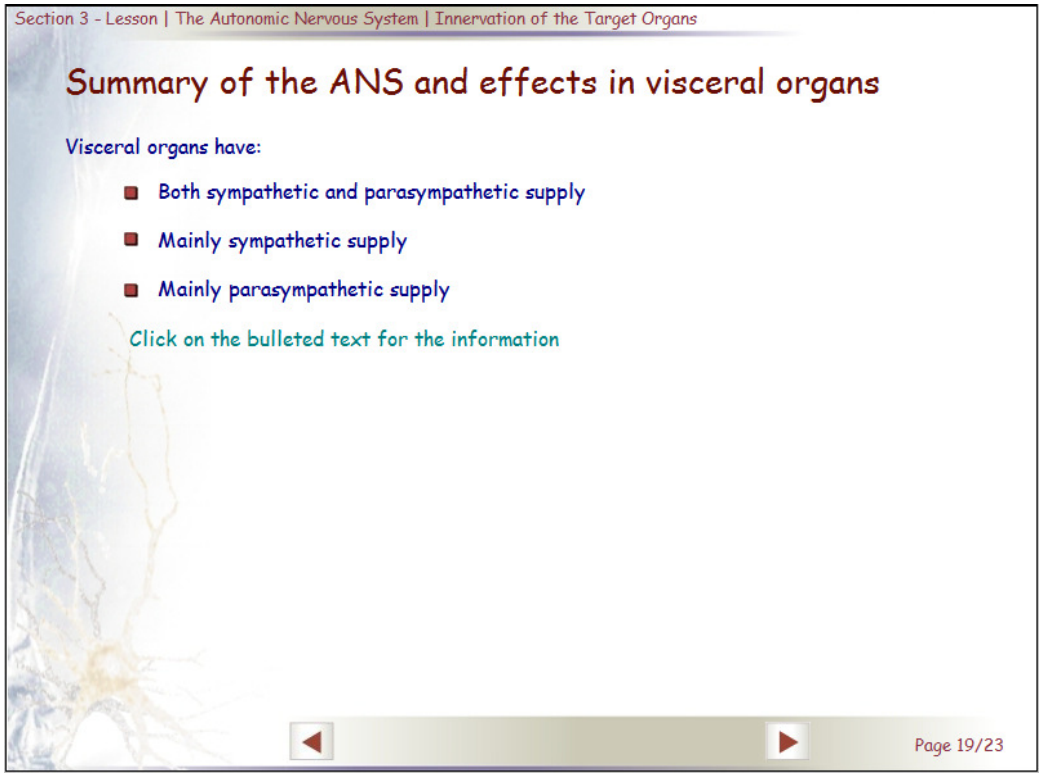
APPENDIX J: MULTIMEDIA INTERVENTION: WHOLE VIEW VERSUS PARTS VIEW

Animation version – Screen 18

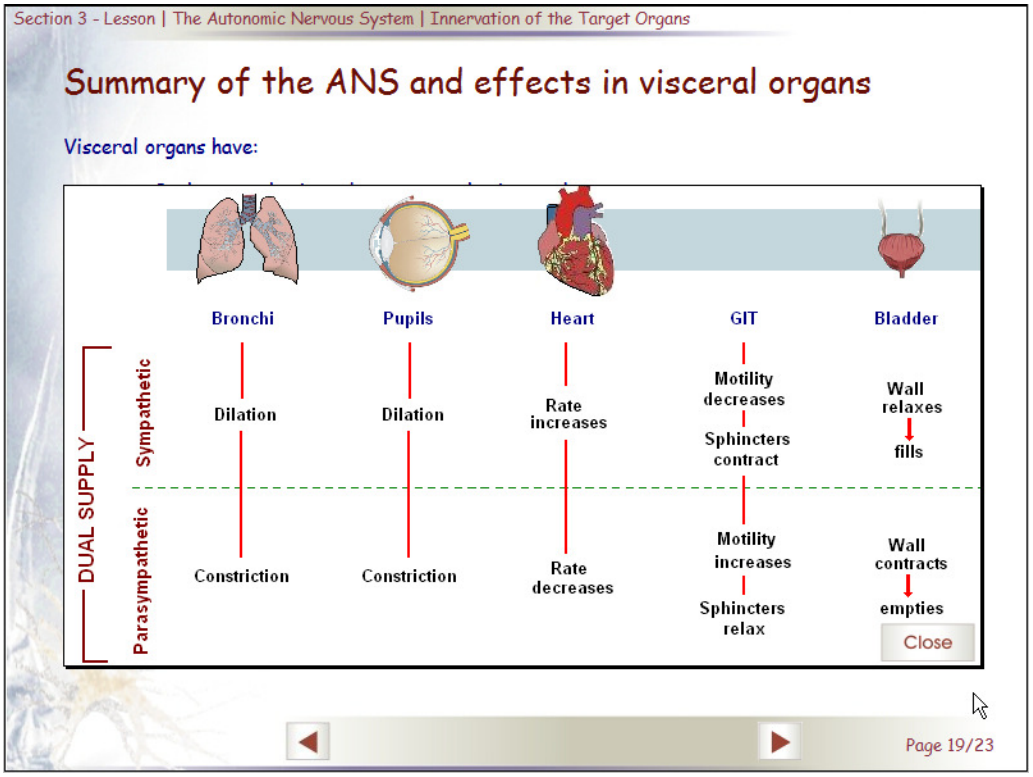


All information presented in one table

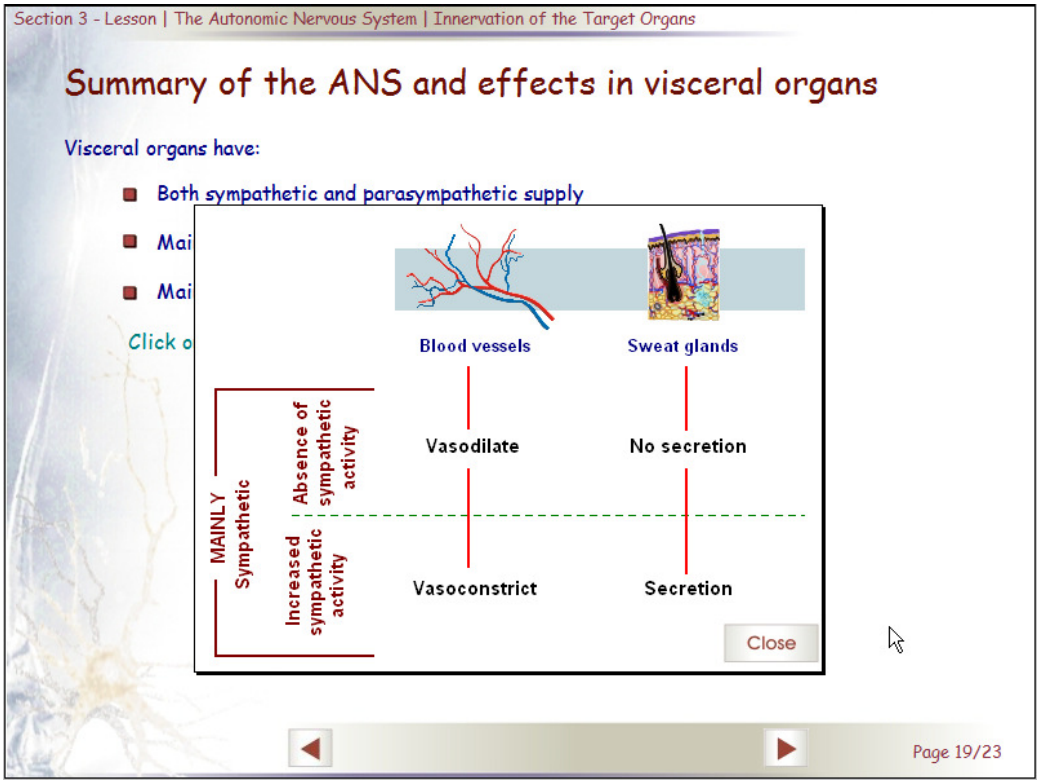
Static images & text version – Screen 19



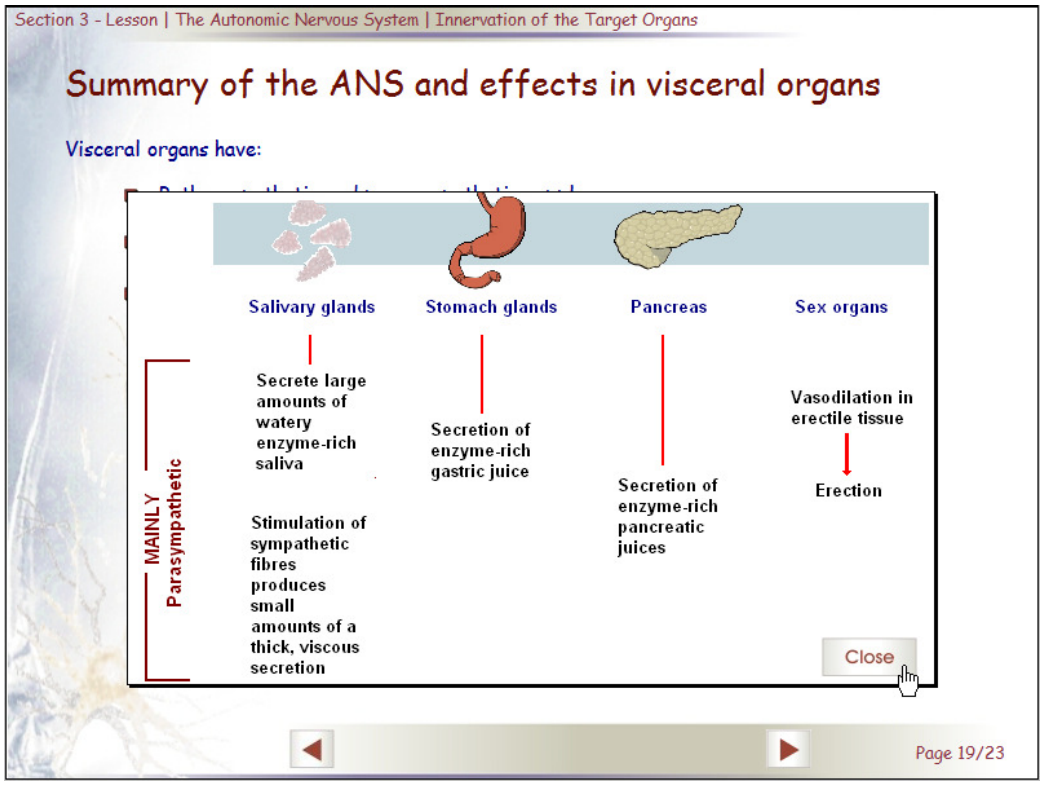
Information accessed by clicking on bulleted text



Information provided in smaller chunks with text and visual material



Second pop-up for screen 19



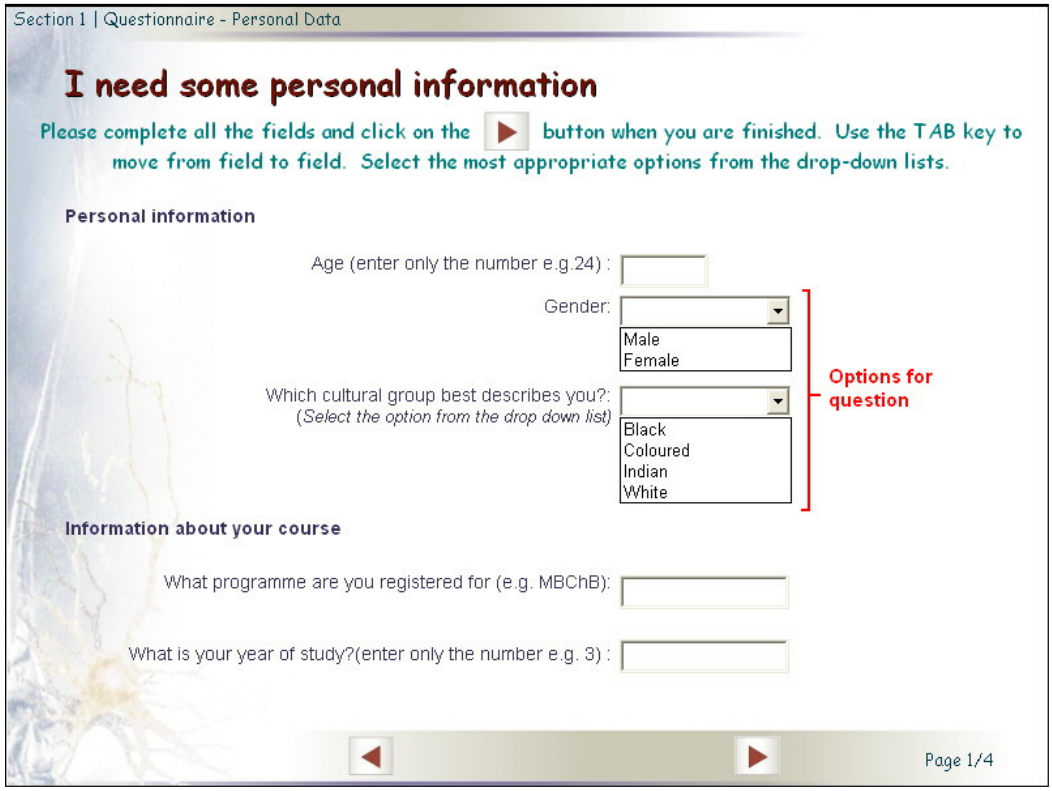
Third pop-up for screen 19

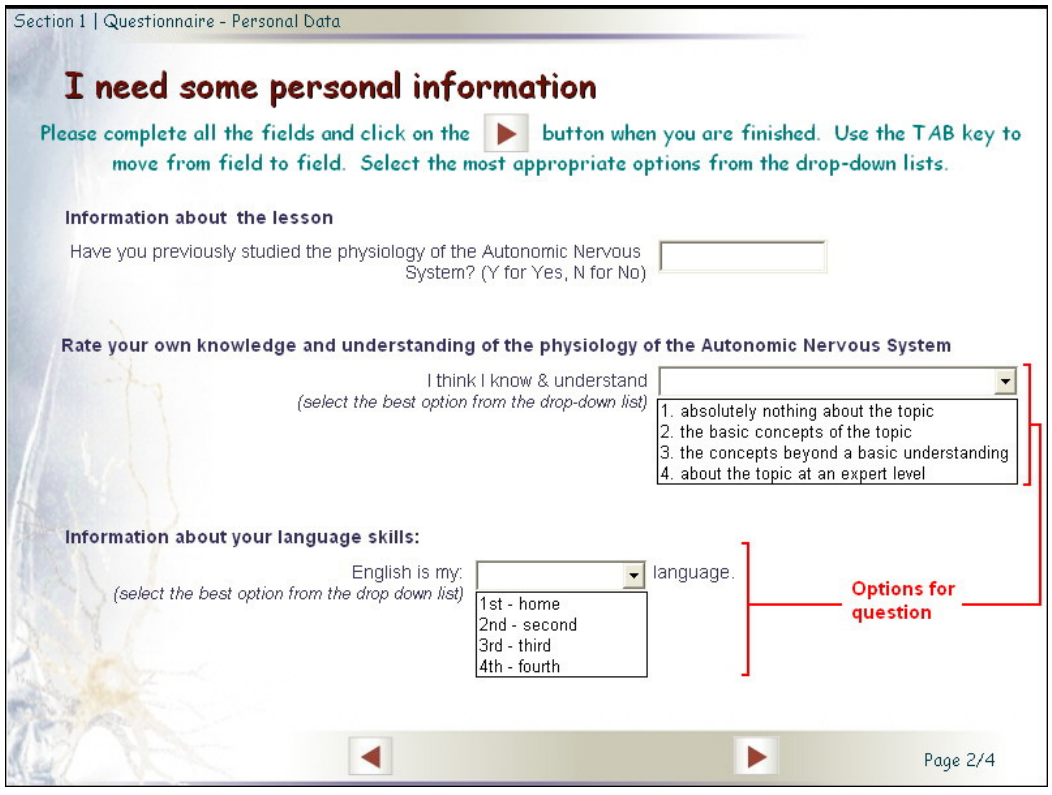
APPENDIX K: A SUMMARY OF THE MULTIMEDIA AND THE INTEGRATION OF THE RESEARCH INSTRUMENTS

Instrument	Section in multimedia	Appendix	It will measure…	Development	No of times administered	Source	Alignment with research sub-question / Purpose of this instrument
Cognitive Style Analysis (CSA)	Not included	Not included	Cognitive style	Existing instrument	Once	License to use CSA purchased from Learning & Training Technology, UK	What are the cognitive styles of the participants taking part in the study? What is the relationship between cognitive style and cognitive load when learning with multimedia?
Practice secondary task	1	Appendix G		Self-developed	Once – at beginning of multimedia	Not applicable	This was included to expose the participants to the direct measurement technique for measuring cognitive load. This was an attempt to control the potential extraneous cognitive load caused by this secondary task.
Demographic questionnaire	2	Appendix M	Demographic profile of sample	Self-developed	Once	Not applicable	Provides data for other potential covariates.
Self-report rating scale	2	Appendix N	Self-rating of Verbaliser-Imager dimension of cognitive style	**Modified** an existing instrument	Once	Adaptation of Mayer's instrument (Mayer & Massa, 2003)	What are the cognitive styles of the participants taking part in the study? The data collected will be used to determine the correlation between self-report measures of the style dimension and the measure obtained using Riding's Cognitive Style Analysis.

Instrument	Section in multimedia	Appendix	It will measure…	Development	No of times administered	Source	Alignment with research sub-question / Purpose of this instrument
Pretest	3	Appendix E	Prior knowledge of learning outcomes. First step in assessing extent of the learning gain.	Self-developed	Once	Physiology textbooks Validated by subject matter experts for content validity	How do participants with different cognitive styles perform when using the same content with different cognitive load?
Self-rating questionnaire	4	See Figure 3.3 on page 137	Self-report rating of mental load	Embedded at selected points in the program. Existing instrument	**Version 1** Five (5) times **Version 2** Six (6) times	Developed by Paas (1994)	What is the correlation between the participant's self-report of cognitive load and the direct measure of the cognitive load of the content? Which presentation format was instructionally more efficient? To what extent do the presentation formats influence cognitive load? What is the relationship between cognitive style and cognitive load when learning with multimedia?
Direct measurement technique	4	See Figure 3.9 and 3.10 on page 162	Cognitive load	Instrument embedded at selected points in multimedia program. **Protocol modified** for Smith's study (2007). Basic principles not changed.	**Version 1** Eleven (11) times. **Version 2** Thirteen (13) times.	Method described by Brünken, Plass & Leutner (2003).	
Posttest - Section 1	5	Appendix F	Knowledge and achievement of learning outcomes.	**Self-developed**	Once	Same test as pretest	How do participants with different cognitive styles perform when using the same content with different cognitive load? Which presentation format was instructionally more efficient?
Posttest - Section 2	Not included in multimedia		Test ability to apply knowledge.	**Self-developed** - pencil and paper test	Once	Validated by subject matter experts for content validity	

APPENDIX L: ELECTRONIC QUESTIONNAIRE TO COLLECT DEMOGRAPHIC DATA





APPENDIX M: ALLOCATION OF GROUPS FOR THE MAIN STUDY

	Animation version **10:30 – 12:30**		**Static images & text version** **12:30 – 14:30**	
Session 1	**HWS Lab** Lesson 1 Group 1 Sample size: n = 17	**HWS Lab** Lesson 2 Group 16 Sample size: n = 17	**HWS Lab** Lesson 3 Group 6 Sample size: n = 17	**HWS Lab** Lesson 4 Group 9 Sample size: n = 16
	BMW Lab Lesson 1 Group 2 Sample size: n = 16	**BMW Lab** Lesson 2 Group 15 Sample size: n = 16	**BMW Lab** Lesson 3 Group 5 Sample size: n = 16	**BMW Lab** Lesson 4 Group 10 Sample size: n = 16
Session 2	**HWS Lab** Lesson 1 Group 3 Sample size: n = 16	**HWS Lab** Lesson 2 Group 14 Sample size: n = 16	**HWS Lab** Lesson 3 Group 7 Sample size: n = 16	**HWS Lab** Lesson 4 Group 12 Sample size: n = 16
	BMW Lab Lesson 1 Group 4 Sample size: n = 16	**BMW Lab** Lesson 2 Group 13 Sample size: n = 17	**BMW Lab** Lesson 3 Group 8 Sample size: n = 16	**BMW Lab** Lesson 4 Group 11 Sample size: n = 17

APPENDIX N: EXAMPLE OF DATA FOR A SINGLE PARTICIPANT - WRITTEN OUT TO AN .INI FILE

[Bookmark]
Last screen=\att04

[Accessed Lesson Date]
Date=02/27/06

[Accessed Lesson Time]
Time=10:59:46

[Exited Lesson Time]
Time=11:54:57

[**XXXXXXXX**] - **Student number removed to protect identity of participant**
02/27/06
Student No V1=**XXXXXXXX - Student number removed to protect identity of participant**

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[Demographic Data3]
Age V3=18

[Demographic Data4]
Gender V4=2

[Demographic Data5]
Culture V5=3

[Course Detail 1]
Programme V6=MBCHB

[Course Detail 2]
Year of study V7=2

[Lesson Detail]
Prior Know V8=0

[Self rating]
Self rating V9=2

[Language]
Language V10=
Language V10=2

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SBCSQ1 V11=5

[SBCSQ2]
SBCSQ2 V12=4

[SBCSQ3]
SBCSQ3 V13=4

[SBCSQ4]
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[SBCSQ7]
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[ScreenData -Screen 1_2]
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[ScreenData -Screen 1_3]
Time in=10:44:23

[ScreenData -Screen 1_4]
Time out=10:45:50

[ScreenData -Screen 2]
Screen No=Using this multimedia 2

[ScreenData -Screen 2_2]
Date in=02/27/06

[ScreenData -Screen 2_3]
Time in=10:45:50

[ScreenData -Screen 2_4]
Time out=10:47:33

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V19=1

[Pretest Q2.2]
V20=1

[Pretest Q3.1]
V21=1

[Pretest Q3.2]
V22=1

[Pretest Q3.3]
V23=1

[Pretest Q3.4]
V24=1

[Pretest Q3.5]
V25=1

[Pretest Q3.6]
V26=1

[Pretest Q4]

V27=1

[Pretest Q5]
V28=1

[Pretest Q6]
V29=0

[Pretest Q7.1]
V30=0

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V31=0

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V32=1

[Pretest Q7.4]
V33=0

[Pretest Q7.5]
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V37=1

[Pretest Q8.4]
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[Pretest Q9]
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[CL02]
Cognitive load V41=8

[CL03]
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[CL04]
Cognitive load V43=.

[CL05]
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[CL06]
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[Meta Cog 2]
V48=.

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V70=0

[Posttest Q9]
V71=1

[Posttest Open1]
V72=.

[Posttest Open 2]
V73=.

[Survey S1.1]
V74=4

[Survey S1.2]
V75=5

[Survey S1.3]
V76=4

[Survey S1.4]
V77=5

[Survey S1.5]
V78=5

[Survey S1.6]
V79=5

[Survey S1.7]
V80=5

[Survey S2.1]
V81=5

[Survey S2.2]
V82=4

[Survey S2.3]
V83=6

[Survey S2.4]
V84=5

[Survey S2.5]
V85=5

[Survey S2.6]
V86=5

[Survey S2.7]
V87=4

[Survey S3.1]
V88=5

[Survey S3.2]
V89=5

[Survey S3.3]
V90=5

[Survey S3.4]
V91=5

[Survey S4.1]
V92=5

[Survey S4.2]
V93=3

[Survey S4.3]
V94=3

[Survey S4.4]
V95=3

[Survey S4.5]
V96=2

[Survey S4.6]
V97=5

[Survey S4.7]
V98=4

[Trigger]
Trigger1=10:41:18
Trigger2=10:41:28
Trigger3=10:41:38

Trigger4=10:41:48

[sScreen01]
10:59:51=Exited

[sScreen02]
10:59:51=Accessed
11:00:35=Exited

[sScreen03]
11:00:35=Accessed
11:01:00=Exited

[sScreen04]
11:01:00=Accessed
11:03:44=Exited
11:03:52=Accessed
11:05:24=Exited

[Responses1_2]
11:01:14=Hit space bar
11:04:08=Hit space bar

[Responses1_3]
11:01:25=Hit space bar
11:04:17=Hit space bar
11:04:18=Hit space bar

[Responses1_4]
11:01:34=Hit space bar
11:04:27=Hit space bar

[sScreen05]
11:03:44=Accessed
11:03:52=Exited
11:05:24=Accessed
11:08:05=Exited

[Responses1_1]
11:03:58=Hit space bar

[sScreen06]
11:08:21=Accessed
11:08:27=Exited
11:08:30=Accessed
11:08:38=Exited

[sScreen07]
11:08:27=Accessed
11:08:30=Exited
11:08:38=Accessed
11:12:10=Exited

[sScreen08]
11:12:10=Accessed
11:14:42=Exited

[Responses3_2]
11:12:25=Hit space bar

[Responses3_3]

11:12:36=Hit space bar

[Responses3_4]
11:12:46=Hit space bar

[sScreen09]
11:14:42=Accessed
11:16:43=Exited

[sScreen10]
11:16:44=Accessed
11:19:18=Exited

[sScreen11]
11:19:18=Accessed
11:21:59=Exited

[Responses5_2]
11:19:34=Hit space bar

[Responses5_3]
11:19:44=Hit space bar

[sScreen12v1]
11:21:59=Accessed
11:30:56=Exited

[sScreen13]
11:31:04=Accessed
11:32:42=Exited

[sScreen14]
11:32:48=Accessed
11:37:05=Exited

[Responses8_3]
11:33:14=Hit space bar

[Responses8_4]
11:33:23=Hit space bar

[sScreen15]
11:37:05=Accessed
11:45:37=Exited

[sScreen16]
11:45:37=Accessed
11:46:07=Exited
11:47:18=Accessed
11:47:45=Exited

[sScreen17]
11:46:08=Accessed
11:47:18=Exited
11:47:45=Accessed
11:47:46=Exited

[sScreen18]
11:47:46=Accessed
11:47:55=Exited
11:48:09=Accessed

11:49:39=Exited

[sScreen19]
11:48:02=Accessed
11:48:09=Exited
11:49:39=Accessed
11:54:17=Exited

[Responses10_1]
11:48:08=Hit space bar

[sScreen20]
11:54:57=Exited

[Survey info]
12:02:58=Accessed
12:03:06=Exited

[Survey S1]
12:03:06=Accessed
12:03:46=Exited

[Survey S2]
12:03:46=Accessed
12:04:26=Exited

[Survey S3]
12:04:26=Accessed
12:04:49=Exited

[Survey S4]
12:04:49=Accessed
12:05:34=Exited

[Thanks]
12:05:34=Accessed
12:05:52=Exited

[Screen logs]
(Screen_Log)= \practice \2 \3 \01 \02 \03 \04 \05 \04 \05 \06 \07 \06 \07 \08 \09 \10 \11 \12v1 \13 \14 \15 \16 \17 \16 \17 \18 \19 \18 \19 \end lesson \final surv \exit

APPENDIX O: STUDENT HANDOUT - PARTICIPATION IN THE STUDY

Letter of consent

The relationship between cognitive load, cognitive style and multimedia learning

A study in the use of multimedia in physiology

Dear Participant

You are invited to participate in a research project aimed at exploring the role which cognitive load and cognitive style play in the successful achievement of learning outcomes when using animations as multimedia learning resources within the higher education sector. The study will also investigate the interrelationship between cognitive load, which is influenced by both the nature of the content and the specific design strategies used, and the cognitive style of the person using the multimedia.

Your participation in this research project is voluntary and confidential. You will not be asked to reveal any information that will allow your identity to be established by persons reading the results of the study. At this stage no follow-up interviews are planned. Attached to this letter is a document explaining your role in this research process. It includes the information provided to you during the briefing. The results from this study will be used to improve existing / extend the range of design guidelines for developing multimedia which makes extensive use of animation and images. The results will also inform designers of the extent to which the design should accommodate different cognitive styles.

If you are willing to participate in this study, please sign this letter as a declaration of your consent, i.e. that you participate in this project willingly and that you understand that you may withdraw from the research project at any time. Participation in this phase of the project does not obligate you to participate in follow up individual interviews, however, should you decide to participate in follow-up interviews your participation is still voluntary and you may withdraw at any time. Under no circumstances will the identity of interview participants be made known to the Faculty of Health Sciences or your individual lecturers. The research is done in fulfillment of the requirements for a doctoral degree in the department of Teaching and Training Studies, University of Pretoria.

Participant's signature: ---------- Date: ----------

Student No: ---------- ----------

Researcher's signature: ---------- Date: ----------

Yours sincerely

Anne Strehler

Accessing the work

Open Windows Explorer

Cognitive styles analysis

- There is a folder on the C: drive – C:/CSA.
- There are two files in this folder.
- Click on the file CSA.EXE.
- Read the instructions carefully.

Before you close the program – call the research assistant to write down your scores

Opening the Lesson

- There is a folder on the C: drive – C:/Lesson1 OR C:/Lesson2 OR C:/Lesson2 OR C:/Lesson2.
- There are several files in this folder.
- Click on the file Lesson1.exe OR Lesson2.exe OR Lesson3.exe OR Lesson4.exe.
- The program will take a few seconds to open – please be patient.
- Start as soon as it is open.
- Read the instructions carefully.

Participation in the study – What the researcher expects from you

1. You have already been assigned to a particular session and the number of the lesson you must do. The way research participants are assigned is VERY important and affects the validity of the data.
2. Please do NOT swop with anyone.
3. Write your student number on each page of the handout.
4. Read all instructions carefully – everything you need to know is displayed ON THE SCREEN.
5. Do BOTH the Cognitive Styles Analysis and the lesson.
6. Please take this session seriously.
7. Answer EVERY question on every screen – including the ones embedded in between the content of the lesson.
8. Work individually – once the session starts PLEASE do NOT confer with your peers or talk to each other.
9. If you need help – ASK.
10. If the program bombs out – log in again – it is bookmarked and you can continue where you left off.
11. STUDY the content on the screen – this is a STUDY session – some of the content is not going to be repeated in your Block 3.
12. Follow ALL the links.

Results of Cognitive Style Analysis

Student Number ----------

WA Ratio ----------

VI Ratio ----------

Scribble page

Use this page to make any notes / mind maps etc while you study the content in the multimedia

Student No: .....

APPENDIX P: RIDING'S COGNITIVE STYLES ANALYSIS

The CSA provides a score for each dimension in the cognitive style model. The ratios for each style dimension typically range from 0.4 through to 4.0 with a central value around 1.0. But for descriptive convenience, the dimensions may be divided into groupings and given labels (Riding, 2005a).

Riding clearly states:

> *Since each dimension is a continuum, the labels are used only for descriptive convenience, and are not meant to imply that there are style 'types' in any absolute sense. There is no requirement to use the same cut-off points as those given by the CSA, as long as the cut-offs are clearly reported in the research report.*
>
> *Riding (2005a, page 7).*

The cut-off points suggested by Riding (2005a) for the ratios on each dimension are given below.

WHOLIST-ANALYTIC Dimension				
	>1.35	Analytic Verbaliser	Analytic Bimodal	Analytic Imager
	>1.02 and <=1.35	Intermediate Verbaliser	Intermediate Bimodal	Intermediate Imager
	<=1.02	Wholist Verbaliser	Wholist Bimodal	Wholist Imager
		<=0.98	>0.98 and <=1.09	>1.09
		VERBALISER–IMAGER Dimension		

There are researchers who divide the style only into two categories with the following ranges: Wholists <0.99 and Analytics >1.00; Verbalisers < 0.93 and Imagers > 1.00 (Riding, Glass & Douglas, 1993).