

version 2.0

Moxie

Viewers

manual

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Introduction

The MoXie Viewer is software that enables you to synchronously view video and concurrently acquired signals. Rehabilitation is an important field of application for the MoXie Viewer, because it can be a tool in gait analysis. Video images can be judged in combination with measured electromyograms (EMG), ground reaction forces, joint angles and three-dimensional marker data.

The MoXie Viewer is developed at the VU University Medical Center by Lia Out (Data Processing and IT Department), Jaap Harlaar and Caroline Doorenbosch (Rehabilitation Medicine). The development was supported by the 'Innovatiecentrum Revalidatietechnologie' in Enschede, the Netherlands.

This user guide is meant for every user, but focuses on gait and motion analysis (video, EMG and force data).

MoXie is a free abbreviation with letters of the words Movement and XML data format. Data files suitable for the MoXie Viewer have the extension MOX.

User guide


Opening screen

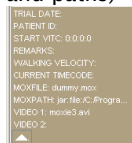
The MoXie Viewer screen has four panels:

1. Upper-left beige panel: menubar with options like *File*, *Playback Speed*, *Goniometer* and *SAGA ruler*.

2. White panel on the left: checkbox list of available data.

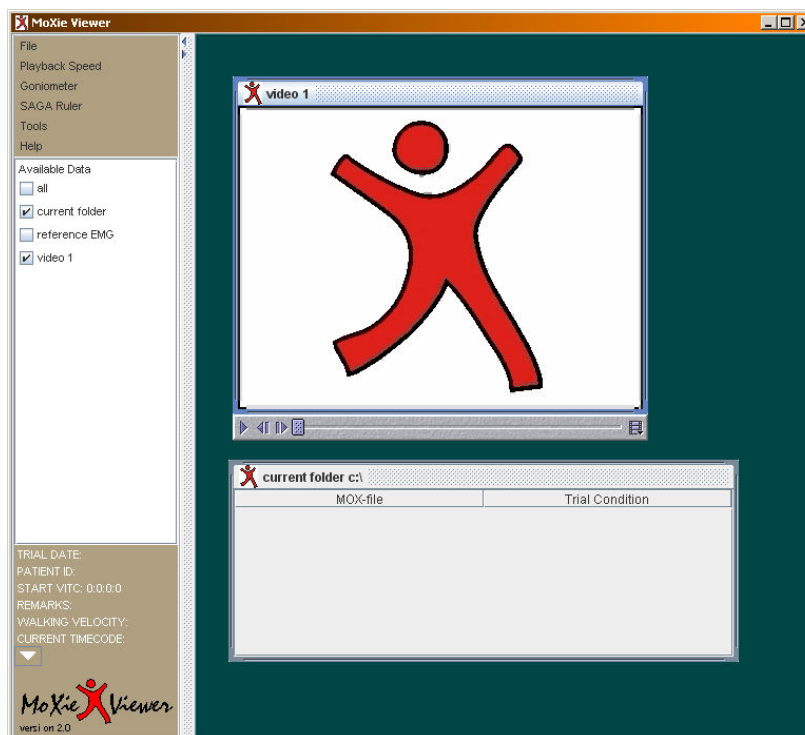
3. Lower-left beige panel: patient and trial information (e.g. *trial date*, *patient id*, *start vitc*, *remarks*, *walking velocity*, *current timecode*)

After clicking on the arrow , more technical details will be visible (e.g. filenames and paths)



TRIAL DATE:
PATIENT ID:
START VITC: 0:0:0.0
REMARKS:
WALKING VELOCITY:
CURRENT TIMECODE:
MOXFILE: dummy.mox
MOXPATH: jarfile:JC:Progra...
VIDEO 1: movie3.avi
VIDEO 2:
▲

4. Right panel: video and data graphs.

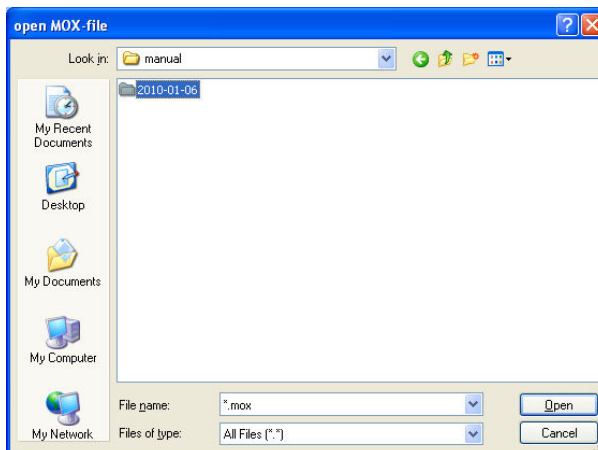


HINT The beige/white panel on the left can be made smaller by clicking the uppermost arrow at the top of the gray vertical bar on the right side of this panel. This gives you more space for graphs and the video image.

Opening datafiles

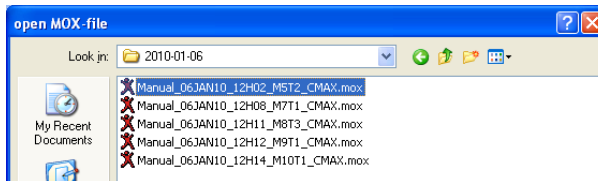
Choose *Open MOX-file* in the *File* menu to open a datafile. (*Open AVI-file* only opens a video, *View datafile* presents the XML data structure in a new browser window).

Select the folder of your choice.



Select a MOX file, in this example:

Manual_06JAN10_12H02_M5T2_CMAX.mox



Then subsequently the data and the video(s) are being loaded, which can be followed by progress bars on the screen.



A datafile can also be opened by a mouse click on the filename in the *current folder* window.

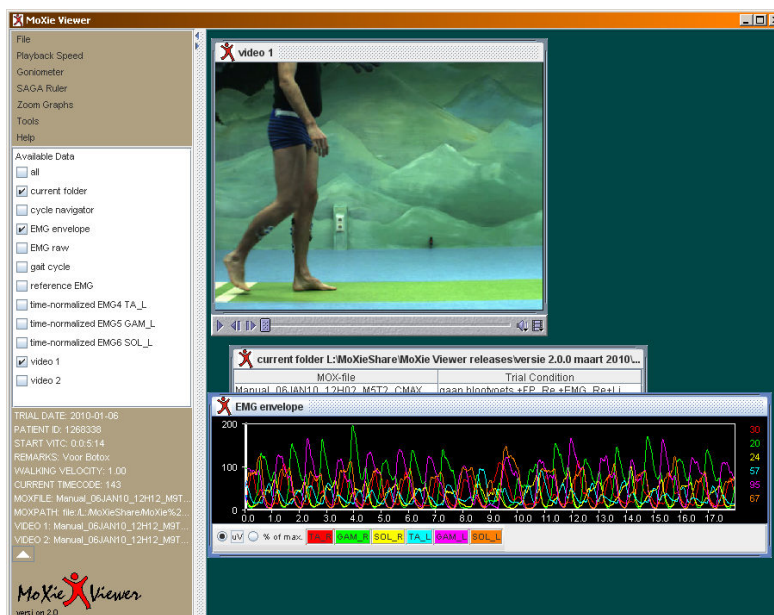
MOX-file	Trial Condition
Manual_06JAN10_12H02_M5T2_CMAX...	gaan blootvoets +FP_Re +EMG_Re+Li
Manual_06JAN10_12H08_M7T1_CMAX...	gaan blootvoets +FP_Li +EMG_Re+Li
Manual_06JAN10_12H11_M8T3_CMAX...	gaan blootvoets +EMG_Re+Li video Re
Manual_06JAN10_12H12_M9T1_CMAX...	gaan blootvoets +EMG_Re+Li video Li
Manual_06JAN10_12H14_M10T1_CMAX...	gaan geschoeid alleen video Li EMG Li+...

Usage of the viewer

Opening view

This MOX-file example shows the following items at start-up:

- one video image (video 1) with a control panel underneath
- EMG signals (EMG envelope)



Check 'video 2' to show both video's simultaneously

HINT Clicking with the mouse in a graph brings up the corresponding video image.



Available data

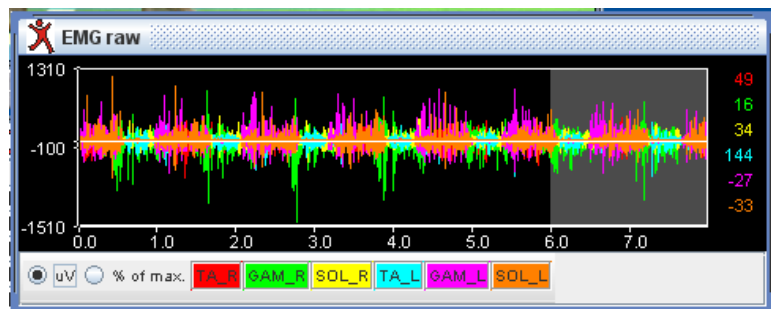
<p>Available Data</p> <input type="checkbox"/> all <input checked="" type="checkbox"/> current folder <input type="checkbox"/> cycle navigator <input checked="" type="checkbox"/> EMG envelope <input type="checkbox"/> EMG raw <input type="checkbox"/> gait cycle <input type="checkbox"/> reference EMG <input type="checkbox"/> time-normalized EMG4 TA_L <input type="checkbox"/> time-normalized EMG5 GAM_L <input type="checkbox"/> time-normalized EMG6 SOL_L <input checked="" type="checkbox"/> video 1 <input checked="" type="checkbox"/> video 2	<p>Available Data</p> <input type="checkbox"/> all <input checked="" type="checkbox"/> current folder <input checked="" type="checkbox"/> EMG envelope <input checked="" type="checkbox"/> Forceplate <input type="checkbox"/> reference EMG <input checked="" type="checkbox"/> video 1 <input type="checkbox"/> video 2	<p>Available Data</p> <input type="checkbox"/> all <input checked="" type="checkbox"/> current folder <input type="checkbox"/> reference EMG <input checked="" type="checkbox"/> video 1
---	---	---

The list of items below *Available Data* is based on the data in the MOX-file that is open, *and can therefore differ for every trial*. By checking an item a window appears with the corresponding data.

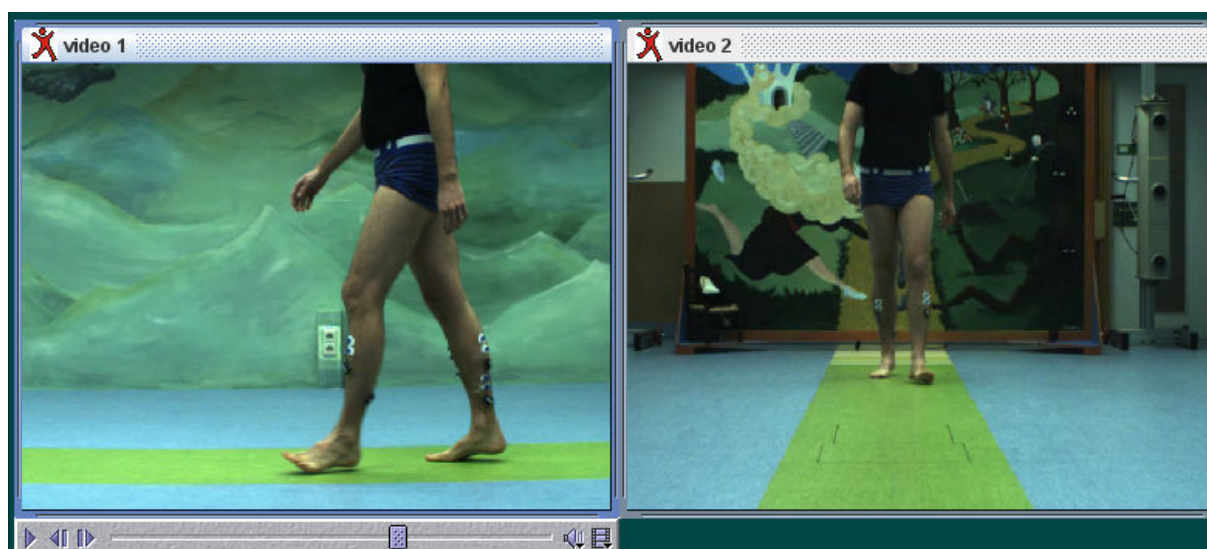
When *EMG raw* is checked in this example the following graph appears:

Example of *Available Data* with no EMG raw present.

Example of *Available Data* with only video present.



Video



Control panel:



play/pause button



slider (*drag it and the video image changes along, click next to it and the video image jumps in time*)



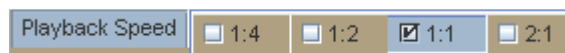
frame-by-frame (*forward or backward*)

HINT The arrow keys also make the video go one frame forward (right arrow) or backward (left arrow). Click in the video window and activate it before using the arrow keys.

NOTE The control panel of the video is always in the foreground.

Choose *Playback Speed* from the menu and a choice appears:

1:4 (*four times as slow*) or 1:2 (*twice as slow*) or 1:1 (*true speed*) or 2:1 (*twice as fast*). Click on the play button of the control panel of the video player to see the result.

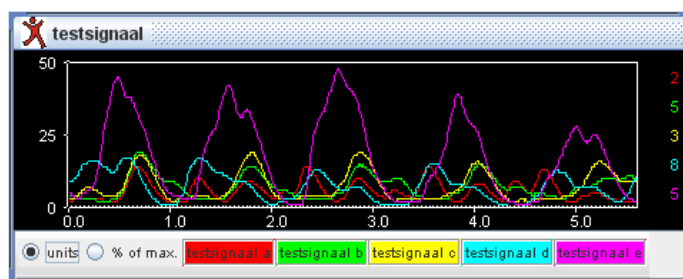


The chosen playback speeds different from 1:1 will be displayed. e.g:



Acquired signals

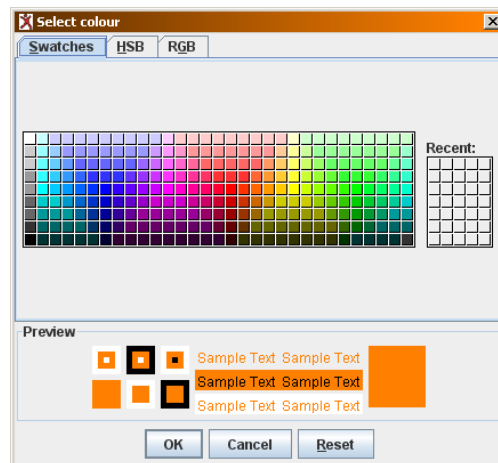
All acquired signals are in graphs. Except for the below mentioned data types, also different kind of data can be viewed. As a rule signals of which the first part of the channel label is equal are put together in a graph. The name of the signal equals the whole channel label. Channel labels in this example were *testsignaal a*, *testsignaal b*, etc.



Change signal color

For all displayed signals, the color can be changed.

Move the mouse to the signal label and click on the right mouse button: a new window with a palette will appear to choose a preferred color for this session.



EMG envelope

The behaviour of the graphs will be explained using 'EMG envelope' as an example. Turning a signal (here: muscle) 'on' or 'off' is achieved by pressing the coloured buttons with signal labels (here: muscle names) below the graph.

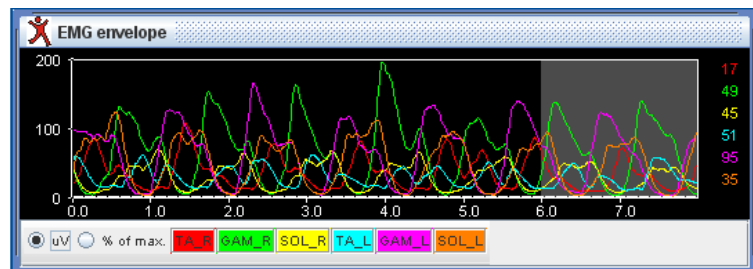


The signal values belonging to the currently displayed video frame are on the right of the graph. They are in units (here: μV) or as a %age of maximum; depending on what is checked:



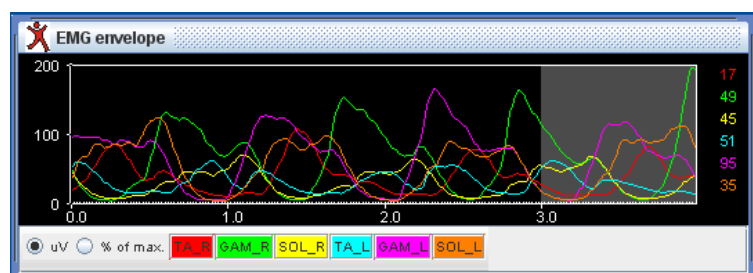
The colour of the numbers corresponds to the colour of the channel labels.

Through *Zoom Graphs* in the menu the time base of the graphs can be changed. In this example a time base of four seconds is chosen.

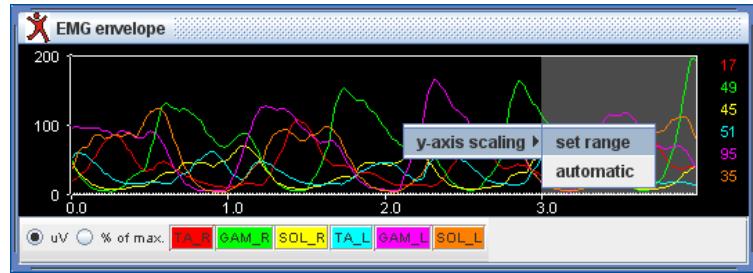


As a result, the time axis adjusts itself as shown for EMG:

When the mouse is clicked in one of the grey area's at both ends of the graphs the time axis jumps such that the current time is never at the edge of the graph.



The y axis can be adjusted by right-clicking the graph. With *set range* a minimum and a maximum value can be set, with *automatic* minimum and maximum are calculated from the amplitude of the signals.

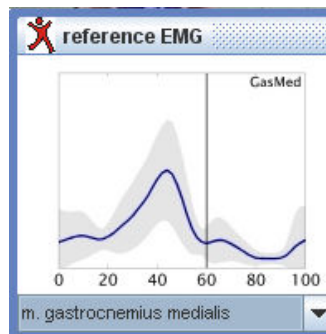


Reference EMG

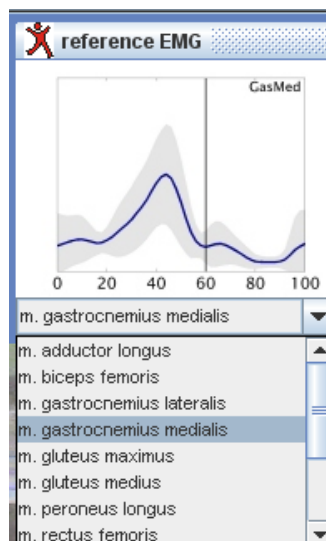
By checking 'reference EMG' in the left white panel a separate window appears with the reference EMG of a gait cycle.

- Available Data
- all
 - current folder
 - EMG envelope
 - EMG raw
 - Forceplate
 - reference EMG
 - video 1
 - video 2

In this example the reference values of m. gastrocnemius lateralis are shown. The white line is the mean and the grey area around it is the standard deviation as determined in a study of David A. Winter (Electromyography in human gait. In: *The Biomechanics and Motor Control of Human Gait: Normal, Elderly and Pathological*, Second Edition, pp. 53–73. David A. Winter, Waterloo Biomechanics, 1991).






By clicking the arrow below different muscles can be chosen.



Time-normalized or gait cycle EMG

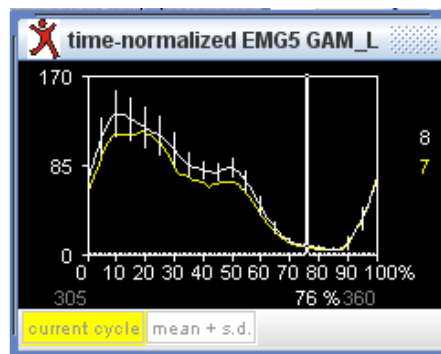
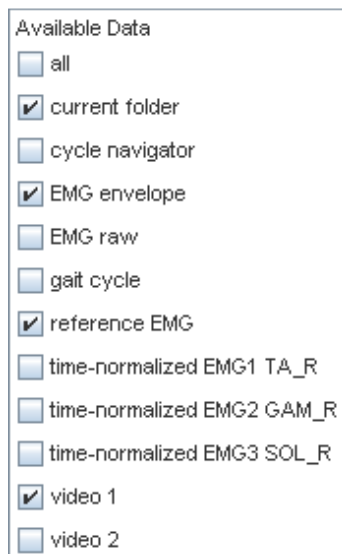
The MoXie Viewer has the possibility of showing time normalized EMG. A prerequisite is that time-normalized EMG is available in the MOX-file. Of every gait cycle the timecode of initial contact (IC) must be established, and the EMG signals of the measured muscles must be normalized for every cycle (gait cycle = 100%). Also the mean and the standard deviation must be known per muscle. If this information is present in the opened MOX-file, the number of items in the left white panel is strongly augmented.

An example of a graph with time-normalized EMG is shown.

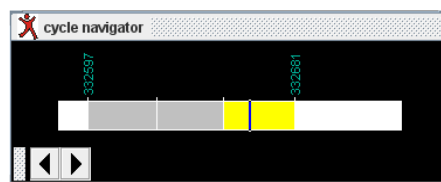
When *cycle navigator* is checked, the bar as shown here appears. The normalized gait cycles are represented as blocks, yellow for the current, grey for the other cycles. By a mouse click in one of the blocks, video and graphs jump to the same moment in time. By pressing one of the arrows  the video jumps to the same point in the next  or the previous  gait cycle.

When *gait cycle* is checked, a bar appears that can serve as a reference for the phases of a gait cycle. The pink line (here at 20%; midstance) shows the position of the video image.

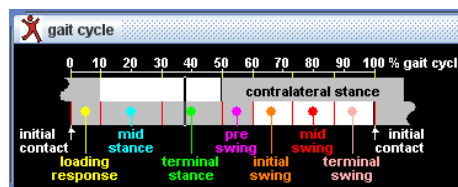
A mouse click in the bar causes the video and graphs to jump to the same point in the present gait cycle.



In this graph the yellow line is the EMG of the 'current gait cycle'; i.e. of the gait cycle of the current video image (the yellow line changes with every new cycle). The white line is the mean of all gait cycles, the vertical bars are standard deviations.



The yellow block represents the present cycle.



Force signals



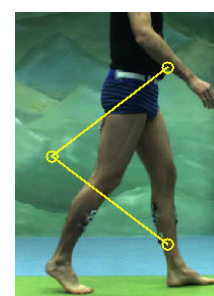
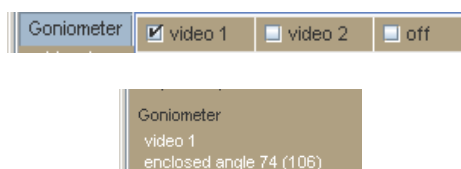
If force data is acquired *Available Data* contains a Forceplate item. The measured signals are in the graph.

If the MOX-file also contains information necessary to project the force signals onto camera images (DLT parameters), the size and direction of the force signal are drawn as a pink line on top of the video image.

By right-clicking the video image the pink line can either be shown or hidden (show/hide reaction force).

Goniometer

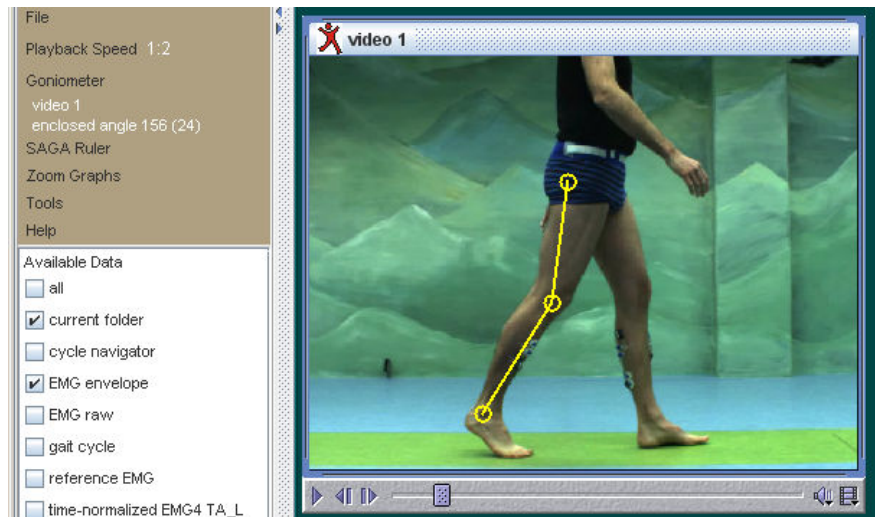
When *Goniometer* is selected in the menu, one of the video's present must be selected (video 1 or 2). As a result a goniometer is drawn on top of the video image. The value of the enclosed angle and its complement (in parentheses) appear in the menu.



The goniometer appears at an arbitrary position.

In the example the goniometer is placed on the upper and lower leg (enclosed angle 138° (42°)).

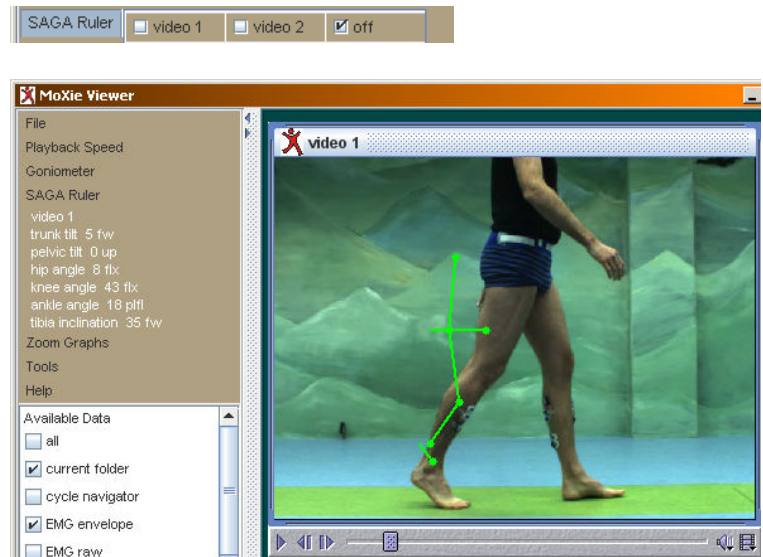
The three circles (two end points and the point of rotation) of the goniometer can be repositioned by dragging with the mouse (a hand appears).



SAGA ruler

When the *SAGA ruler* (Basic **S**Agittal **G**Ait **r**uler) is checked in the menu, one of the video's present must be selected (video 1 or 2). The SAGA ruler will be drawn on top of the video image.

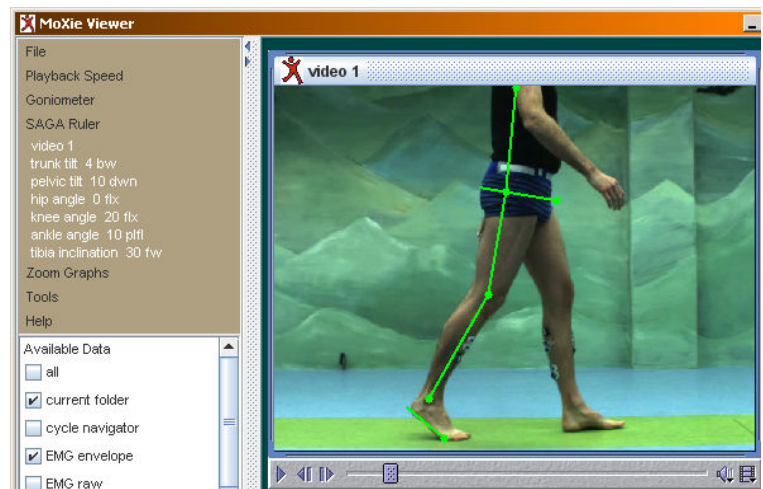
Initially, the SAGAruler will appear in the checked video on a random position (first picture). The values of the joint angles will appear in the menu.



By dragging with the mouse, the SAGA ruler can be replaced, scaled and rotated (second picture).

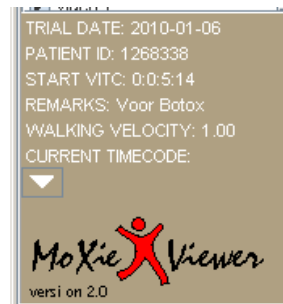
The entire SAGA ruler can be replaced by dragging with the mouse when the cursor has the form of a cross. Scaling is done through the points for hip, knee and ankle; a hand appears. Rotation can be done at the toe, the front of the pelvis and the top of the trunk; a bowed arrow appears.

Note: The SAGA ruler is mirrored horizontally by rotating the front of the pelvis through a vertical axis.

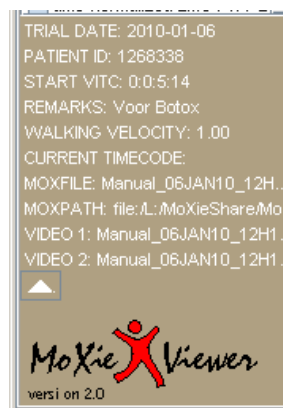


Extra information

In the lower left corner is extra information concerning the present patient and trial, provided that this information is available in the MOX-file.



After clicking the arrow more detailed information will appear:

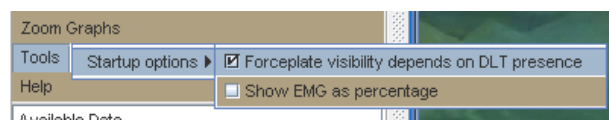


Tools menu

With the *Tools menu* it is possible to set *Startup options*.

Checking *Forceplate visibility depends on DLT presence* has the following result: when opening a MOX-file the *Forceplate* graph will only be open if the MOX-file contains DLT-parameters (necessary to show the ground reaction force vector on top of the video image).

If *Show EMG as percentage* is checked, *EMG envelope* is opened presenting the signals as a percentage of the maximum of the whole signal.



System description

MoXie Viewer is a Java program wrapped up in a Java archive called *moxieweviewer.jar*. It can both be run as a Java applet and as a Java application. The applet is started through an HTML page. The application is started by double-clicking *moxieweviewer.jar*. A Java Runtime Environment (JRE) is a prerequisite for running Java programs, the Java Media Framework (JMF) takes care of playing video.

Applet

HTML page and JRE

The HTML page from which the applet is called must contain an object like this:

```
<OBJECT classid="clsid:8AD9C840-044E-11D1-B3E9-00805F499D93" codebase = " jre-6u1-windows-i586-p.exe #Version=6,0,3" WIDTH = "100%" HEIGHT = "100%">
<PARAM NAME = "code" VALUE =
"moxieweviewer/MainApplet.class">
<PARAM NAME = "archive" VALUE = "moxieweviewer.jar">
<PARAM NAME = "name" VALUE = "MoXie Viewer">
<PARAM NAME = "image" value="">
<PARAM NAME = "type" VALUE="application/x-java-
applet;version=1.6.0">
<PARAM NAME = "scriptable" VALUE="false">
<PARAM NAME = "mode" VALUE = "moxie viewer">
<!--PARAM NAME = "datafile" VALUE = "c:\test\test.mox"--
>
<PARAM NAME = "startdirectory" VALUE =
"c:\moxieweviewer\data">
<COMMENT>
<EMBED
    type = "application/x-java-applet;version=1.6"
    pluginspage =
http://java.sun.com/products/plugin/index.html#download
    code = "moxieweviewer/MainApplet.class"
    archive = "moxieweviewer.jar"
    width = "100%"
    height = "100%"
    name = "MoXie Viewer"
    image = ""
    scriptable="false"
    mode = "moxie viewer"
    datafile = ""
    startdirectory = "c:\moxieweviewer\data"
</EMBED>
</COMMENT>
</OBJECT>
```

Internet Explorer interprets the contents of the **OBJECT** tag and ignores the contents of the **COMMENT** tag. Mozilla browsers (Firefox) ignore a **COMMENT** tag with the **CLASSID** attribute and interpret the contents of the **COMMENT** tag.

The **CLASSID** tells which JAVA Runtime Environment (JRE) must be used. The value "clsid:8AD9C840-044E-11D1-B3E9-00805F499D93" means that the highest available version of the JRE must be used. It is also possible to point to a specific version, e.g. JRE version 1.6.0. In that case **CLASSID** has value "clsid:CAFEFAC-0016-0000-0000-ABCDEFEDCBA".

If the user has an older version of the JRE than defined in the **CODEBASE** attribute, or if no JRE is present, the user will be prompted to install the version **CODEBASE** is pointing to. In this case that is the JRE installation file that was packaged with the MoXie Viewer software: *jre-6u1-windows-i586-p.exe*. If the user has the same or a newer version of the JRE, that version will be used.

IMAGE is used because otherwise an animation is shown which slows down loading of the applet.

MODE can have one of the following values: *moxie viewer* or *telemoxie viewer*. In this case **MODE** is *moxie viewer*.

Attribute **DATAFILE** is only used in the *moxie viewer* mode. If **DATAFILE** is not empty, then the viewer starts with that **MOX**-file. **DATAFILE** can be a file path as

well as a filename. If DATAFILE is just a filename then it is expected to be in the same folder as *moxieweaver.jar*.

Attribute **STARTDIRECTORY** is only used in the *moxie viewer* mode. If the user is going to open a file through the menu this folder is opened first.

JMF

In order to be able to playback video, the Java Media Framework (JMF) will, if necessary, be automatically installed by the JMF installation file that is packaged with the MoXie Viewer software: *jmf-2_1_1e-windows-i586.exe*. When the JMF is installed, archive *jmf.jar* is being put in the lib\ext folder of the JRE. When the JRE is updated this causes a problem, because *jmf.jar* is not being found anymore. For that reason, the program always checks whether the JMF functions properly. If not, the JMF will be re-installed. The user then is prompted to restart the browser.

Application

JRE and JMF

When the MoXie Viewer is installed on a local pc, Java Runtime Environment (JRE) and Java Media Framework (JMF) are not installed but placed in a subfolder of the program.

Datafile

The MoXie Viewer can be started by double-clicking on a *MOX-file*.

Caching of video files

If the MoXie Viewer is started without being specified which datafile to open, it starts with a dummy MOX- and video file, both of which are part of *moxieweaver.jar*. If the user opens a MOX-file, that file always contains a reference to a video file. This video file will be downloaded to folder *java.io.tmpdir/moxieweaver*. This is a different folder on every pc and for every user. When the browser is closed the downloaded files are removed.

System demands

The MoXie Viewer runs on a Windows operating system. Minimal demands are:

- Windows2000
- Intel Pentium 4
- 256 MB RAM

Installation guide

I The MoXie Viewer is on a pc

The MoXie Viewer is installed by double clicking *setup.exe*. The MoXie Viewer will by default be placed in *c:\program files\moxie*. An example dataset is placed in *c:\my documents\moxie data\example data*.

A shortcut to the MoXie Viewer will appear on the desktop.

II The MoXie Viewer is on a network

1. Location of files

The system administrator puts the following files in the same folder of a web server:

jmf-2_1_1e-windows-i586.exe

jre-6u1-windows-i586-p.exe

moxieviewer.html

moxieviewer_.html

moxieviewer.jar

moxie2.ico

releaseinfo_viewer.rtf

and the following file in a subfolder called *Manuals*:

manual moxie viewer.pdf

2. Change startdirectory

The folder that appears every time a file is opened in the MoXie Viewer can be changed as follows: Open *moxieviewer.html* in a text editor for instance WordPad. Change at two locations the value of parameter STARTDIRECTORY. Save the file. The next time the MoXie Viewer is opened the folder is changed.

The following steps are carried out on every user's pc:

3. Make a shortcut

Make a shortcut on the desktop to the HTML page that starts the MoXie Viewer (*moxieviewer.html*) by placing the mouse cursor on the desktop, pressing the right mouse button and selecting *New -> Shortcut*. Then the path to the HTML page can be given, and a name can be assigned to the shortcut.

It is also convenient to add *moxieviewer.html* to the favorites or bookmarks of the browser.

4. Change icon

When the mouse cursor is placed on the shortcut and the right mouse button is pressed, a menu containing *Properties* appears. Under *Properties* the icon can be changed into *moxie2.ico*.

5. Installation of JRE and JMF

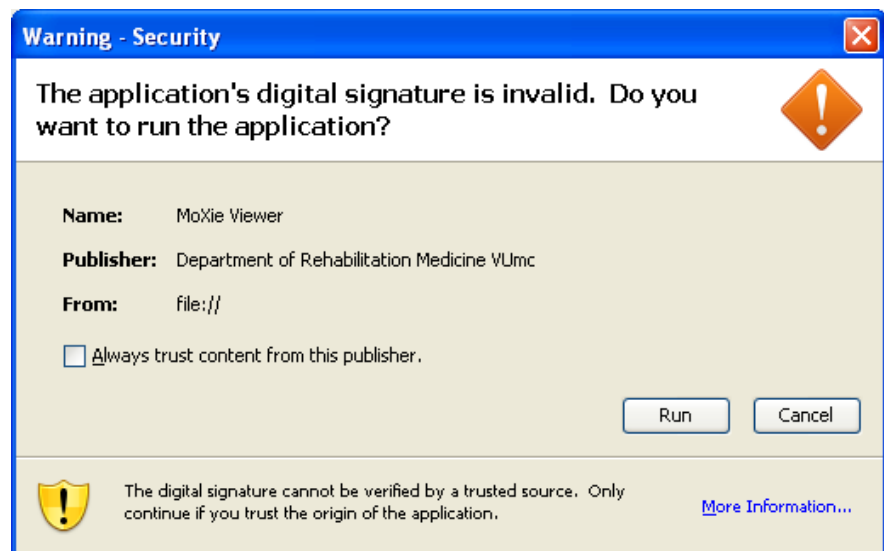
When the MoXie Viewer is opened both the JAVA Runtime Environment (JRE) and the JAVA Media Framework (JMF) will be automatically installed if necessary. The browser must be restarted afterwards.

If this doesn't happen automatically install the JRE and JMF manually by first running *jre-6u1-windows-i586-p.exe* and then *jmf-2_1_1e-windows-i586.exe*.

6. Security Warning

When the MoXie Viewer is started for the first time the following warning appears:

If you trust the origin of the application check *Always trust content from this publisher* and choose *Run*.



Datafiles

The MoXie Viewer uses XML datafiles. The extension of the files is .MOX.

XML stands for 'extensible markup language', and is managed by the World Wide Web Consortium. It is akin to HTML, like HTML it uses for instance *tags* (words between brackets with < and >). However, the elements used in an XML file are not fixed, but can be specified for every field of application. The structure of XML files is defined in an XML schema. For the MoXie Viewer the schema is called *moxie_viewer.xsd*, and can be found at <http://www.smalll.nl/vumc/rev/moxie>.

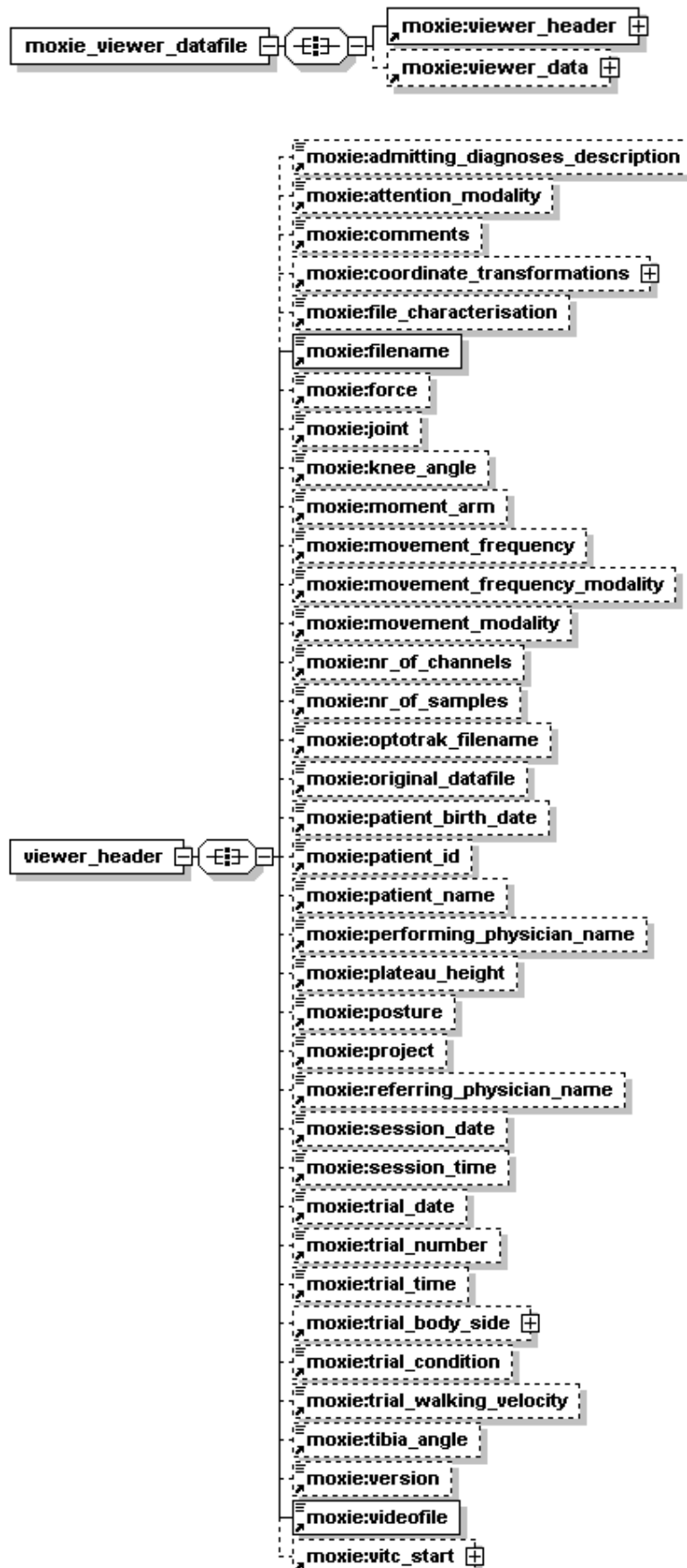
Advantages of XML:

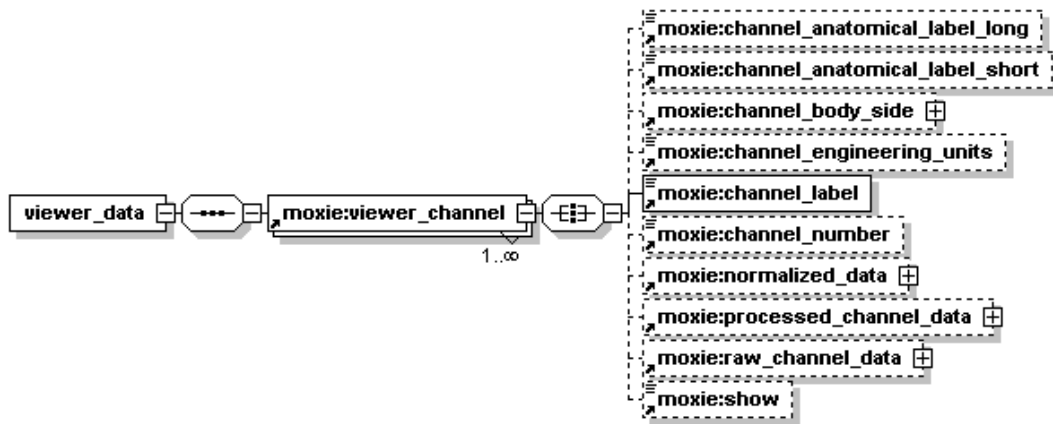
- the possibility to specify elements very accurately.
- flexibility: if it appears to be necessary, elements can be added to an XML schema
- the possibility to validate datafiles by checking them against the schema
- much software can deal with XML
- XML files are human-readable in a text-editor or a browser

Disadvantages of XML:

- files are relatively large because all data is written as text

XML schema of MOX-files





Elements used in MOX-files

admitting_diagnoses_description

type	xs:string
annotation	documentation Description of the admitting diagnosis (diagnoses)

attention_modality

type	restriction of xs:string
facets	pattern FOCUSED DISTRACTED UNKNOWN
annotation	documentation Description of the patient's attention

body_side

type	restriction of xs:string
used by	elements channel_body_side trial_body_side
facets	pattern LEFT RIGHT UNKNOWN
annotation	documentation Body side

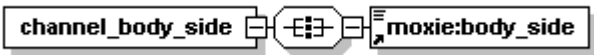
channel_anatomical_label_long

type	xs:string
annotation	documentation Anatomical description, for instance full muscle name, or joint name

channel_anatomical_label_short

type	xs:string
annotation	documentation Anatomical code, for instance "TA" for "m. tibialis anterior"

channel_body_side

diagram	
annotation	documentation Side of the body to which a channel is connected

channel_data

type	list of xs:decimal
used by	elements channel_data_AD_units processed_channel_data raw_channel_data
annotation	documentation Data measured at one channel

channel_engineering_units

type	xs:string
annotation	documentation Description of engineering units

channel_label

type	xs:string
annotation	documentation Describes the nature of the signal measured

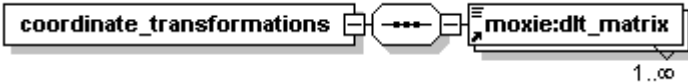
channel_number

type	xs:unsignedShort
annotation	documentation Equipment physical channel number used for acquisition


comments

type	xs:string
annotation	documentation Comments made by the performing physician

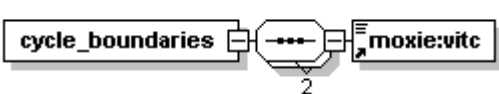
coordinate_transformations

diagram	
annotation	documentation Contains a DLT matrix for each video camera

cycle

diagram	
used by	element normalized_data
annotation	documentation Contains both the cycle boundaries and the data


cycle_boundaries

diagram	
used by	element cycle
annotation	documentation Beginning and end VITC of a cycle


cycle_data

type	list of <code>xs:decimal</code>
used by	elements cycle cycles_mean cycles_sd
annotation	documentation Resampled data

cycles_mean

diagram	
used by	element normalized_data
annotation	documentation Mean of cycles

cycles_sd

diagram	
used by	element normalized_data
annotation	documentation Standard deviation of cycles

dlt_matrix

type	list of <code>xs:decimal</code>
used by	element coordinate_transformations
annotation	documentation Eleven Direct Linear Transformation parameters that relate camera coordinates to spatial coordinates

file_characterisation

type	<code>xs:string</code>
annotation	documentation Defines of the nature of the present file, e.g. the name of the test carried out

filename

type	<code>xs:string</code>
annotation	documentation Filename of the present file given at its creation

force

type	restriction of xs:string
facets	pattern YES NO UNKNOWN
annotation	documentation Defines whether movements are carried out against manual force

joint

type	restriction of xs:string
facets	pattern ANKLE ELBOW HIP KNEE SHOULDER WRIST UNKNOWN
annotation	documentation Joint of investigation

knee_angle

type	xs:short
annotation	documentation Knee angle (deg)

moment_arm

type	xs:unsignedShort
annotation	documentation Perpendicular distance from the line of application of a force to the axis of rotation (cm)

movement_frequency

type	xs:unsignedShort
annotation	documentation Frequency of limb movement. Required if Movement Frequency Modality has value IMPOSED.

movement_frequency_modality

type	restriction of xs:string
facets	pattern FREE IMPOSED UNKNOWN
annotation	documentation Defines whether the repetitive limb movements were carried out following a timing device (e.g. a metronome) or not (IMPOSED vs. FREE)

movement_modality

type	restriction of xs:string
facets	pattern ACTIVE PASSIVE UNKNOWN
annotation	documentation Defines whether the repetitive movements are carried out with or without manual guidance (PASSIVE vs. ACTIVE)

normalized_data

diagram	<pre> classDiagram class normalized_data class moxie_cycle["moxie:cycle"] class moxie_cycles_mean["moxie:cycles_mean"] class moxie_cycles_sd["moxie:cycles_sd"] normalized_data "1" -- "1..∞" moxie_cycle normalized_data "1" -- "1" moxie_cycles_mean normalized_data "1" -- "1" moxie_cycles_sd </pre>
annotation	documentation Data resampled in cycles, e.g. gait cycles

nr_of_channels

type	xs:unsignedShort
annotation	documentation Number of channels present in this datafile

nr_of_samples

type	xs:unsignedInt
annotation	documentation Number of samples per channel

optotrak_filename

type	xs:string
annotation	documentation Filename of the Optotrak file with data acquired simultaneously with the present trial

original_datafile

type	xs:string
annotation	documentation Datafile (e.g. MDF-file) that was converted to XML

patient_birth_date

type	xs:date
annotation	documentation Date of birth of the patient

patient_id

type	xs:string
annotation	documentation Primary hospital identification number or code for the patient

patient_name

type	xs:string
annotation	documentation Patient's full name

performing_physician_name

type	xs:string
annotation	documentation Physician administering the trial

plateau_height

type	xs:unsignedShort
annotation	documentation Height of the foot dynamometer plateau (in cm)

posture

type	restriction of xs:string
facets	pattern SITTING SITTING - KNEE EXT. SITTING - KNEE FL. STANDING LYING LYING - KNEE EXT. LYING - KNEE FL. LYING - SIDE UNKNOWN
annotation	documentation Posture of the patient

processed_channel_data

diagram	
annotation	documentation Processed channel data

project

type	xs:string
annotation	documentation Project that the present trial is part of

raw_channel_data

diagram	
annotation	documentation Raw data measured at one channel in engineering units

referring_physician_name

type	xs:string
annotation	documentation Patient's primary referring physician for this visit

sampling_frequency

type	xs:unsignedLong
used by	elements channel_data_AD_units processed_channel_data raw_channel_data
annotation	documentation Sampling frequency of the data (Hz)

session_date

type	xs:date
annotation	documentation Date of the session

session_time

type	xs:time
annotation	documentation Time at which the acquisition of the session information was started


show

type	xs:boolean
annotation	documentation True if this channel contains meaningful data, can be used by a viewer

tibia_angle

type	xs:short
annotation	documentation Angle of the tibia with respect to the horizontal (deg)

trial_body_side

diagram	
annotation	documentation Side of the body at which a test is performed

trial_condition

type	xs:string
annotation	documentation Description of a trial condition

trial_date

type	xs:date
annotation	documentation Date of the trial

trial_number

type	xs:unsignedShort
annotation	documentation A number that identifies this trial

trial_time

type	xs:time
annotation	documentation Time the trial ended

trial_walking_velocity

type	xs:decimal
annotation	documentation Normal walking velocity as measured at the start of a trial (m/s)

version

type	xs:string
annotation	documentation Version of the data file, e.g. 01.01


videofile

type	xs:string
annotation	documentation String of one or more videofilenames separated by asterisks

vitc

type	xs:unsignedLong
used by	elements cycle_boundaries vitc_start

vitc_start

diagram	
annotation	documentation Starting VITC of the video

Example of a MOX-file

In dit example the channel_data elements are reduced.

```
<?xml version="1.0" encoding="UTF-8"?>
<moxie_viewer_datafile xmlns="http://www.small1.nl/vumc/rev/moxie"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.small1.nl/vumc/rev/moxie
http://www.small1.nl/vumc/rev/moxie/moxie_viewer.xsd">
  <viewer_header>
    <original_datafile>nwalk02.mdf</original_datafile>
    <nr_of_channels>9</nr_of_channels>
    <videofile>nwalk02.AVI</videofile>
    <vitc_start>
      <vitc>332585</vitc>
    </vitc_start>
    <coordinate_transformations>
      <dlt_matrix>-0.164036 0.068132 0.000666 119.884916 0.004198 0.052368 -0.166773
256.425021 0.000038 0.000345 0.000000 1.0</dlt_matrix>
      <dlt_matrix>0.048805 0.175859 0.001817 263.671102 0.035007 0.000510 -0.170733
262.519716 0.000189 0.000014 0.000000 1.0</dlt_matrix>
    </coordinate_transformations>
    <filename>nwalk02.mox</filename>
  </viewer_header>
  <viewer_data>
    <viewer_channel>
      <channel_label>Timecode</channel_label>
      <raw_channel_data>
        <sampling_frequency>100</sampling_frequency>
        <channel_data>332468 332468 332469 332469 332469 332469 332470 332470 332470
332470</channel_data>
      </raw_channel_data>
    </viewer_channel>
    <viewer_channel>
      <channel_label>EMG</channel_label>
      <channel_anatomical_label_short>glumx_R</channel_anatomical_label_short>
      <processed_channel_data>
        <sampling_frequency>100</sampling_frequency>
        <channel_data> 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 3.00 3.00 </channel_data>
      </processed_channel_data>
      <normalized_data>
        <cycle>
          <cycle_boundaries>
            <vitc>332597</vitc>
            <vitc>332625</vitc>
          </cycle_boundaries>
          <cycle_data> 2 2 3 3 3 4 4 5 6 7 7 8 9 11 11 12 13 14 14 14 14 14
13 13 13 12 12 11 11 9 9 8 8 7 7 6 6 5 5 4 4 4 3 3 3 2 2 2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 4 5 6 7 8 8 9 10 10 10 10
10 10 9 9 8 7 7 7 6 6 5 5 4 4 4 3 3 3 3 2 2 2 2 2 3
3</cycle_data>
        </normalized_data>
      </viewer_channel>
  </viewer_data>
</moxie_viewer_datafile>
```

```

</cycle>
<cycle>
  <cycle_boundaries>
    <vitc>332625</vitc>
    <vitc>332652</vitc>
  </cycle_boundaries>
  <cycle_data> 3 3 4 4 5 5 5 6 7 7 7 8 8 9 9 9 9 9 9 9 9
8 8 8 8 8 7 7 7 6 6 5 5 5 4 4 4 4 3 3 3 3 3 4 5 5 5 5
5 6 6 6 6 5 5 5 5 5 5 5 5 6 7 9 10 11 12 14 14 14 14 14 14 13 13
12 12 11 11 10 9 9 7 7 6 6 5 5 4 4 4 3 3 3 2 2 2 2 2
2</cycle_data>
</cycle>
<cycle>
  <cycle_boundaries>
    <vitc>332652</vitc>
    <vitc>332681</vitc>
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8 8 8 7 7 7 6 6 5 5 5 4 4 4 4 4 3 3 3 4 5 5 5 6 6 6 6
6 6 5 5 5 5 4 4 4 4 4 4 3 3 3 3 4 4 6 7 8 9 11 11 13 14 14
14 14 14 13 13 12 12 11 10 9 8 8 7 6 6 5 4 4 3 3 3 2 2 2
2</cycle_data>
</cycle>
<cycles_mean>
  <cycle_data> 2 3 3 3 4 4 4 5 6 7 7 8 9 10 10 10 11 11 11 11 11 11
10 10 10 9 9 8 8 7 7 6 6 5 5 5 5 4 4 3 3 4 4 4 4 4 4 4
4 4 5 4 4 4 4 4 4 4 4 4 3 4 4 5 6 7 8 9 10 11 12 12 12 12
12 12 12 11 11 10 9 9 8 8 7 6 6 5 5 4 4 3 3 3 2 2 2 2 2
2</cycle_data>
</cycles_mean>
<cycles_sd>
  <cycle_data> 1 1 1 1 1 1 1 1 0 0 0 0 1 1 1 1 2 3 3 3 3 3
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  <channel_anatomical_label_short>ABd_R</channel_anatomical_label_short>
  <processed_channel_data>
    <sampling_frequency>100</sampling_frequency>
    <channel_data> 5.00 5.00 5.00 5.00 5.00 5.00 5.00 5.00 5.00 5.00 </channel_data>
  </processed_channel_data>
  <normalized_data>
    <cycle>
      <cycle_boundaries>
        <vitc>332597</vitc>
        <vitc>332625</vitc>

```

```

</cycle_boundaries>
<cycle_data> 3 3 4 4 4 5 5 6 7 8 9 10 11 13 14 15 17 18 18 19 19 19
19 19 19 18 18 17 17 16 15 15 14 14 13 13 12 11 10 10 10 10 9 9 9 9 9 9
9 9 9 9 9 8 8 8 7 7 7 6 6 6 5 5 4 4 4 4 4 4 4 4 3 3 3 3
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 5
5</cycle_data>
</cycle>
<cycle>
  <cycle_boundaries>
    <vitc>332625</vitc>
    <vitc>332652</vitc>
  </cycle_boundaries>
  <cycle_data> 5 6 6 6 7 7 7 8 9 10 11 11 12 13 13 13 14 14 14 14 14 14
14 14 14 13 13 13 12 12 11 11 10 10 9 9 8 8 8 7 7 7 7 7 6 6 6 6
6 6 6 6 6 6 5 5 5 5 4 4 4 4 4 4 3 3 3 3 3 3 3 3 3 3 3 3
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 5 5 5
5</cycle_data>
</cycle>
<cycle>
  <cycle_boundaries>
    <vitc>332652</vitc>
    <vitc>332681</vitc>
  </cycle_boundaries>
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14 14 13 13 13 12 12 11 11 10 10 10 10 9 9 9 9 9 9 9 9 9 9 9 10 10
10 10 10 10 10 9 9 8 8 8 7 6 6 5 5 5 5 4 4 4 4 4 4 4 3 3
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 5 5 5
5</cycle_data>
</cycle>
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  <cycle_data> 4 5 5 5 6 6 6 7 8 9 10 11 12 13 14 14 15 16 16 16 16 16
16 16 15 15 15 14 13 13 12 12 11 11 11 10 10 9 9 9 9 9 9 8 8 8 8 8
8 8 8 8 8 8 7 7 7 7 6 6 5 5 5 5 4 4 4 4 4 4 4 4 3 3 3 3
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 4 4 4 5 5 5
5</cycle_data>
</cycles_mean>
<cycles_sd>
  <cycle_data> 1 2 1 1 1 1 1 1 1 1 1 1 0 0 1 1 2 2 2 3 3 3
3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 1 2 2 2 1 1 2 2 2 2 2
2 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 1 1 0
0</cycle_data>
</cycles_sd>
</normalized_data>
</viewer_channel>
<viewer_channel>
  <channel_label>FP - Force X</channel_label>
  <raw_channel_data>
    <sampling_frequency>100</sampling_frequency>
    <channel_data> -0.49 1.01 -0.19 -0.89 -0.19 -0.19 -0.49 1.31 -0.19 0.61
</channel_data>

```

```

        </raw_channel_data>
    </viewer_channel>
    <viewer_channel>
        <channel_label>FP - Force Y</channel_label>
        <raw_channel_data>
            <sampling_frequency>100</sampling_frequency>
            <channel_data> -0.52 0.98 -0.52 0.98 -0.52 0.28 -0.12 -0.12 -0.52 0.28
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    </raw_channel_data>
</viewer_channel>
    <viewer_channel>
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        </channel_data>
    </raw_channel_data>
</viewer_channel>
    <viewer_channel>
        <channel_label>FP - Moment X</channel_label>
        <raw_channel_data>
            <sampling_frequency>100</sampling_frequency>
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    <viewer_channel>
        <channel_label>FP - Moment Y</channel_label>
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        </channel_data>
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</viewer_channel>
</viewer_data>
</moxie_viewer_datafile>

```