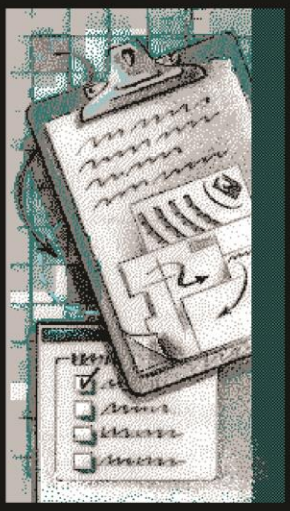

FAS Facial Photographic Analysis Software

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Fetal Alcohol Syndrome Diagnostic & Prevention Network
University of Washington, Seattle WA, U.S.A

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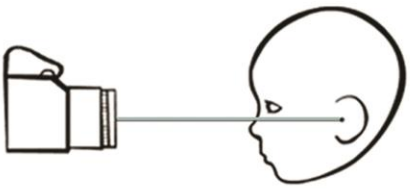

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Watch for software and Instruction Manual updates on the FASDPN website.

www.fasdpn.org

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https://seattlesoftwaredevelopers.com/portfolio/fas/

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About FAS Facial Photographic Analysis Software

FAS Facial Photographic Analysis Software [Version 3]
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This software may not run on your particular hardware/software configuration. The University of Washington and the Fetal Alcohol Syndrome Diagnostic & Prevention Network (FASDPN) bear no responsibility for any direct, indirect, incidental, consequential, special, exemplary, punitive, or other damages arising out of or relating in any way to the use of this software. In addition, the FASDPN cannot provide user support for installing or using this software.

PART I. INTRODUCTION

What is Fetal alcohol syndrome (FAS)?

Fetal alcohol syndrome (FAS) is a permanent birth defect syndrome caused by maternal consumption of alcohol during pregnancy. The syndrome has been broadly characterized by pre- and/or postnatal growth deficiency, a characteristic set of minor facial anomalies and central nervous system (CNS) abnormalities (Jones and Smith, 1973; Clarren and Smith, 1978; Smith, 1979; Rosett, 1980; Sokol and Clarren, 1989; Stratton *et al*., 1996). Although these previous publications do provide guidance, they are not sufficiently specific to assure diagnostic accuracy and precision. In 1997, a new more rigorous and comprehensive, case-defined method for diagnosing the full spectrum of outcomes in individuals with prenatal alcohol exposure was created called the FASD 4-Digit Diagnostic Code (Astley & Clarren, 1997, 1999, 2000; Astley et al., 1999, (Astley) Hemingway, 2024). The 4-Digit Code is a validated set of guidelines intended for use by an interdisciplinary team in a FASD diagnostic clinic (Astley, 2011, 2013; Astley et. al. 2009; 2019; (Astley) Hemingway, 2020, 2024).

The FASD 4-Digit Diagnostic Code

The four digits of the diagnostic code reflect the magnitude of expression of four key diagnostic features of FAS/D in the following order: (1) growth deficiency, (2) the FAS facial phenotype, (3) CNS abnormalities, and (4) gestational alcohol exposure (Fig 1). The 4-Digit Diagnostic Code is generated by first recording key clinical data on the standardized FASD Diagnostic Evaluation Form and following specific case-definitions to generate each digit.

4-Digit Diagnostic Code Grid

				3	4	3	4		
significant	severe	definite	(4)		X		X	(4)	high risk
moderate	moderate	probable	(3)	X		X		(3)	some risk
mild	mild	possible	(2)					(2)	unknown
none	none	unlikely	(1)					(1)	no risk
Growth Deficiency	**FAS Facial Features**	**CNS Damage**		Growth	Face	Brain	Alcohol		**Prenatal Alcohol**

Fig 1. The magnitude of expression of each feature is ranked independently on a 4-point Likert scale with 1 reflecting complete absence of the FAS feature and 4 reflecting a strong "classic" presence of the FAS feature. Each Likert rank is specifically case-defined. The 4-Digit Diagnostic Code can be used to diagnose individuals of all ages. The 4-Digit Diagnostic Code has been used effectively for diagnosis (Astley & Clarren, 2000), screening (Astley et. al., 2002) and surveillance (Astley, 2003) efforts in the Washington State FAS Diagnostic & Prevention Network of clinics since 1997 (Astley et al., 2014). The 2024 diagnostic guide entitled "*Diagnostic Guide for Fetal Alcohol Spectrum Disorders: The 4-Digit Diagnostic Code*" the *Lip-Philtrum Guides*, and the *FAS Facial Photographic Analysis Software (2026)* can be obtained from the website fasdpn.org at no cost.

Facial Features of FAS

In contrast to growth deficiency and brain abnormalities, the one feature that is unique to FAS and prenatal alcohol exposure is the FAS facial phenotype. The FAS facial phenotype as defined by the FASD 4-Digit Diagnostic Code (Hemingway (Astley) 2024) is characterized by the presence of all three of the following minor anomalies at any single point in time (Figs 2A, 2B):

1. **Palpebral fissure lengths** (PFL) two or more standard deviations below the mean.

2. A **smooth philtrum** defined as a Rank 4 or Rank 5 on the 5-point Likert scale depicted on the FASDPN Lip-Philtrum Guides ((Astley) Hemingway, 2024).

3. A **thin upper lip** (thin vermilion border) defined as a Rank 4 or Rank 5 on the 5-point Likert Scale depicted on the FASDPN Lip-Philtrum Guides ((Astley) Hemingway, 2024).

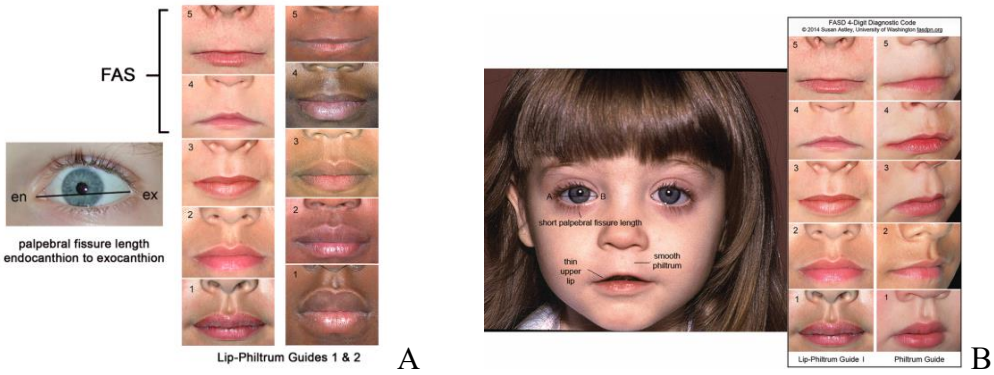


Fig 2A. The three facial features of FAS.
Fig 2B. Example of the 4-Digit Code Rank 4 FAS facial phenotype.

This case-definition for the FAS facial phenotype was derived empirically by Astley and Clarren (1995, 1996), matches the original definition by Smith (1979), and is confirmed to be highly sensitive and specific to FAS and prenatal alcohol exposure (Astley & Clarren 1996, 2001; Astley et al., 2002; 2009; 2013; (Astley) Hemingway, 2020).

Other facial anomalies or syndromes may be present in an individual with prenatal alcohol exposure. The presence of other anomalies or syndromes should be recorded. Their presence does not rule-out FAS/D. Alcohol is a teratogen to all fetuses, including those with other syndromes.

FAS Facial Analysis Software

This software was developed for use by health care and medical research professionals. Computerized image analysis has been used effectively to measure and rank the magnitude of expression of the FAS facial phenotype on thousands of individuals evaluated in the FASDPN clinics (Astley & Clarren, 2001; Astley et al., 2002, Astley, 2010. 2013). This software was developed to provide healthcare professionals with a user-friendly, free, objective method for analyzing facial photographs obtained in a clinical or research setting. Please read the License Agreement for further details.

PART II. GETTING STARTED

Professional qualifications for use of this software

This software is intended for use by healthcare and research professionals.

Computer System

This software is a Microsoft WINDOWS application.
It runs on Windows 10 and 11.
It has been verified to work on an English language version of the Windows operating system.
Please go to fasdpn.org for computer system specifications.

What is new with Version 3. (2026)

Version 2.1.0 (2016) ran successfully for 10 years until a Microsoft Windows11 update in November 2025 rendered it inoperable. Version 3 was developed to look and function just like Version 2.1.0 using more modern programming language that is compatible with current and future Windows updates.

To Install the Facial Software Version 3 (2026)

Please go to the fasdpn.org website for the most current installation instructions.

To Upgrade from Version 2.1.0 (2016)

Please go to the fasdpn.org website for the upgrade instructions. These instructions provide important steps to take to avoid loss of data generated from the previous Version 2.1.0 (2016).

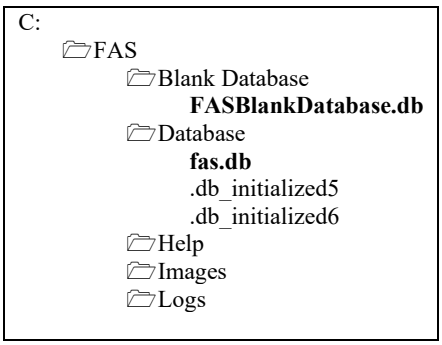
Help

A copy of the License Agreement can be found by clicking on the Help button in the top menu bar when the FAS Facial Photographic Analysis Software is open.

Fundamentals Of Version 3: Managing Databases and Photos

1. The software installation program (Fas_3.1.0_x64-setup.exe) installs the program files in a Fas folder in the Windows Program Files directory on the C drive (C:\Program Files\Fas) by default.

2. The software installation program also creates an FAS folder tree for your photo analysis data files in the root of the C drive (see graphic below). This includes an SQL database file named fas.db. **This FAS folder tree must remain in the root of the C: drive where the software installed it.** The fas.db and FASBlankDatabase.db are identical databases with different names. Both are empty databases with the exception of two practices cases hardwired into each of them. The purpose of the FASBlankDatabase.db is explained below.



3. After you install the software, you can create more than one database to store your photo analysis data in by making a copy of the FASBlankDatabase.db, renaming it and storing it in a directory of your choice. You can rename the file name but you cannot change the file extension **.db** (e.g. rename FASBlankDatabase.**db** to clinic.**db**). You can also store the database file anywhere on your computer or on a network computer.

4. Your photo images are NOT stored in the software's database. Your photo images are stored wherever you decide to store them on your computer. When you open a photo into the software for analysis, the software stores the current location (or path) of the photo on your hard drive in the database. This allows the software to locate the photo if you choose to evaluate it again. **If you move the photo on your hard drive after you have saved the initial photo analysis, the software will not know where to find the photo.** To return the photo to its initial location, click File/Export Records in the top menu to download your data as a .csv file into your computer's Download folder. Open the "Facial Analysis Report.csv" file and go to the "Image Base Path" column (column 10) to see what the original location of the photo was. Drag the photo back to that original location on your hard drive. Click File/Open Existing File from the top menu. Select the case. The photo will now appear.

5. You may load this software on more than one computer.

6. We cannot provide software support. We recommend you involve your IT support personnel when installing this software.

To Open the Software, Establish a Database and Customize Options

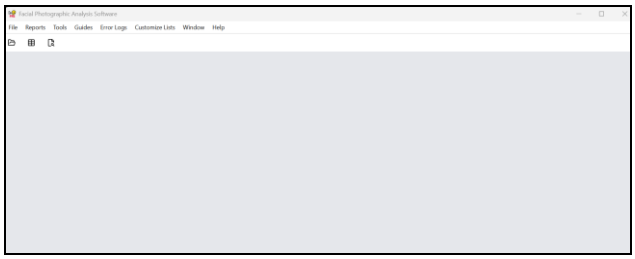


Fig 3. This blank screen will appear when you open the software.

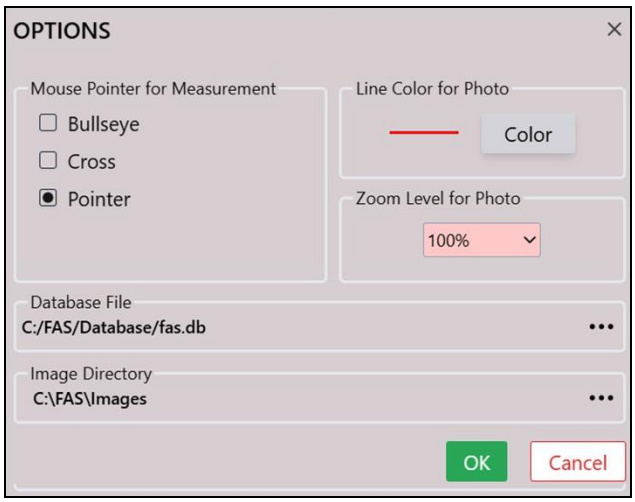


Fig 4. The Tool/Options dropdown window allows you to select the name and location of the database you want to save your data to. It also allows you to select which folder to go to first to look for new images to analyze.

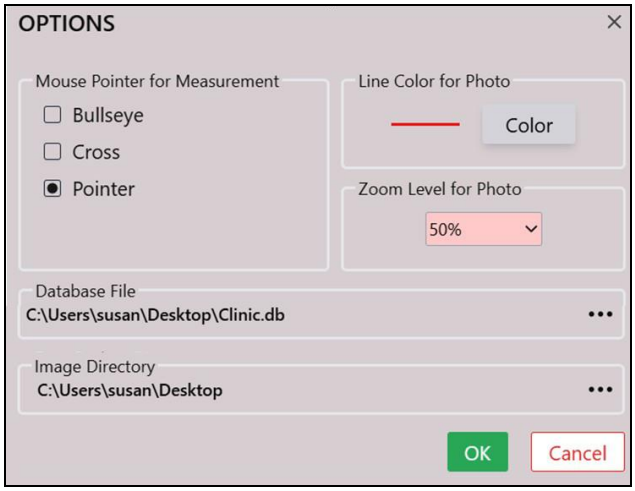


Fig 5. Note the location of the database has been moved to the Desktop and renamed Clinic.db.

1. Click on the shortcut icon on your desktop.

2. The software will open to the following blank screen (Fig 3).

3. The software will open, pointing to the default database **fas.db** where your photo analysis data will be stored (Fig 4).

4. If you want to rename the database and store it in a different directory, do the following:

   a) Close the software. Navigate to C:/FAS/Blank Database/FASBlankDatabase.db, make a copy of FASBlankDatabase.db, rename it (e.g., Clinic.db) and place it in a location of your choice (e.g. the desktop).

   b) Open the Software

   c) Left mouse click on Tools in the top menu bar. Left mouse click on Options from the drop-down menu to open the Options window (Fig 4).

   b) Left mouse click on the browser (…) icon in the "Database File" window. Navigate to the renamed database you created on the desktop (eg., Clinic.db). Click "Open". Note the location and name of the Clinic.db database now appears in the Database File window in the Options window (Fig 5). Click the green OK in the Options window. The software will save all analyses to this database and location until you direct it to a different database and location. Note we also changed where we want the software to start when we navigate to the folder we saved our photos in. It was originally pointing to the Images folder (Fig 4). We changed it to a folder on the desktop (Fig 5).

5. While the Options window is open, select your preferred pointer, line color and default photo zoom level (Fig 5.).

To Open the "John Doe" Demonstration/Practice Case

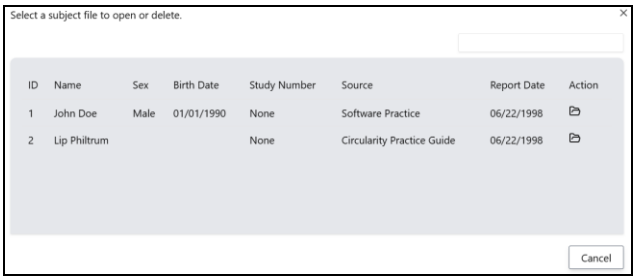


Fig 6. Select an existing subject by clicking on the folder icon.

Fig 7. John Doe Demonstration/Practice Case
John Doe has normal facial features.

Follow the instructions below to open the demonstration/practice case called "John Doe" that comes with the software.

This fictitious demonstration/practice case provides an example of good quality photos and a complete analysis. It also serves as a Practice Case. Instructions for using the Practice Case are presented later in this Instruction Manual.

1. To open, click on File/Open/Existing Subject File from the top menu bar (Fig 6)

2. Click on the folder icon in the Action column for John Doe.

3. John Doe's 3 photos will open on the left (one on top of the other) with a Worksheet on the right (Fig 7).

4. John Doe was measured by Hemingway (Astley). Her measures were permanently saved with the software to serve as a demonstration and practice case (described more fully below). You can practice measuring John Doe. Your measures will temporarily overwrite Astley's measures, but you will not be able to save your measures. When you close the case or the software, all measures will revert to Astley's measures.

PART III. TAKING THE FACIAL PHOTOGRAPHS

How to take the 3 standardized facial photographs

Fig 8. Standardized Photo Set Guide. Example of a normally developed child.

Internal Measure of Scale: An internal measure of scale (an adhesive paper sticker) is placed on the patient's forehead between their eyebrows (Fig 8). It should not be placed high on the forehead or off center to the right or left. A small, adhesive paper sticker no larger than ¾ of an inch (19.05 mm) and no smaller than 1/2 inch (12.7mm) in size should be used and can be purchased from an office supply store. Do not use "homemade' stickers. Use store-bought stickers that are machine cut for accuracy. Make sure the sticker is firmly attached (not curled up along the edges). Print the size of the sticker on the sticker.

Frontal, ¾ and Lateral Photos: A frontal, a ¾ view and a lateral photograph of the patient's face are obtained using a digital camera (Fig 8). The ¾ view is taken to facilitate ranking philtrum smoothness by purposely driving a flash of light across the philtrum to see if a shadow is cast. Stand approximately 4 feet (1.2 meters) from the patient and zoom in with the camera lens so that the patient's head fills the entire frame. This provides the highest resolution image. Holding the camera less than 4 feet from the patient will distort the image and generate incorrect measures. See Fig 11 below for more details.

Facial Expression: The facial expression should be relaxed with no smile, lips gently closed, eyes wide open and no eyeglasses. A smile will make the lip appear thinner and the philtrum appear smoother than they truly are (Fig 9).

Fig 9. This is the same child with and without a smile. When the child smiles, her lip appears thinner and her philtrum appears smoother than it truly is. Rankings based on the top photo would be inaccurate.

Rotation: The lens of the camera should be placed in-line with the patient's *Frankfort Horizontal Plane* as illustrated in Fig 10A. To determine if the camera is in the patient's Frankfort Horizontal Plane when viewing the face through the camera, an imaginary line drawn between the upper border of the left tragus and right tragus should fall across the left and right lower bony orbital rims (Fig 10B). There should also be no left-to-right rotation of the image; both ears should be equally visible in the frontal photo.

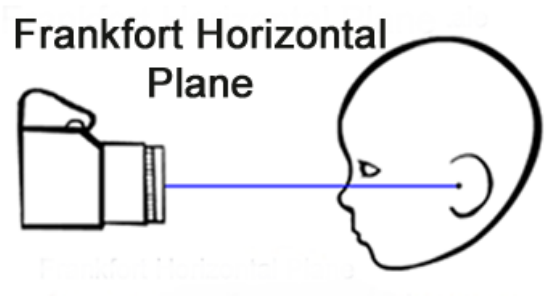


Fig 10A. The center of the camera lens is placed in the patient's Frankfort Horizontal Plane (a line drawn from the external auditory canal through the lower border of the bony orbital rim (orbitale)).

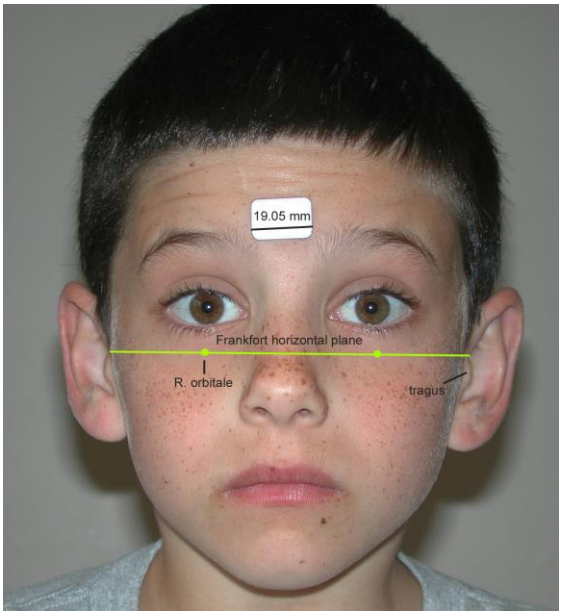


Fig 10B. When viewing the patient through the camera, the camera is in the patient's Frankfort Horizontal Plane if a line drawn between the left and right auditory canals (or the upper border of the right tragus and left tragus) falls along the right and left orbitale landmarks.

Impact of Rotation on Measurement of Features *Upward –Rotation (head tipped back) w*ill make the upper lip appear thicker than it truly is. All other features will be unaffected. *Downward-Rotation*: will make the upper lip appear thinner than it truly is. All other features will be unaffected. *Right or Left Rotation* will cause the circularity measure for lip thinness to be smaller (thicker) than it truly is because the length of the lip will be foreshortened. The mean PFL and inner canthal distance will remain accurate even with marked left or right rotation as long as the endocanthion and exocanthion landmarks are clearly discernable. The reason mean PFL and inner canthal distance are largely unaffected by right-left rotation is because the internal measure of scale is also rotating by an equal degree.

Properly aligned facial photographs are obtained in the FASDPN clinic with a hand-held camera and seated patient. Stereotaxic equipment and tripods are not recommended or necessary. Take multiple photos if necessary. Sometimes one photo will provide a good measure of the eyes while a second photo will provide a good measure of the lips.

Avoid Camera Distortion. **VERY IMPORTANT**: Hold the camera at least 4 feet (1.2 meters) away from the patient when taking their facial photographs. If you stand closer, the facial image will be distorted as demonstrated in the series of photos below (Fig 11).

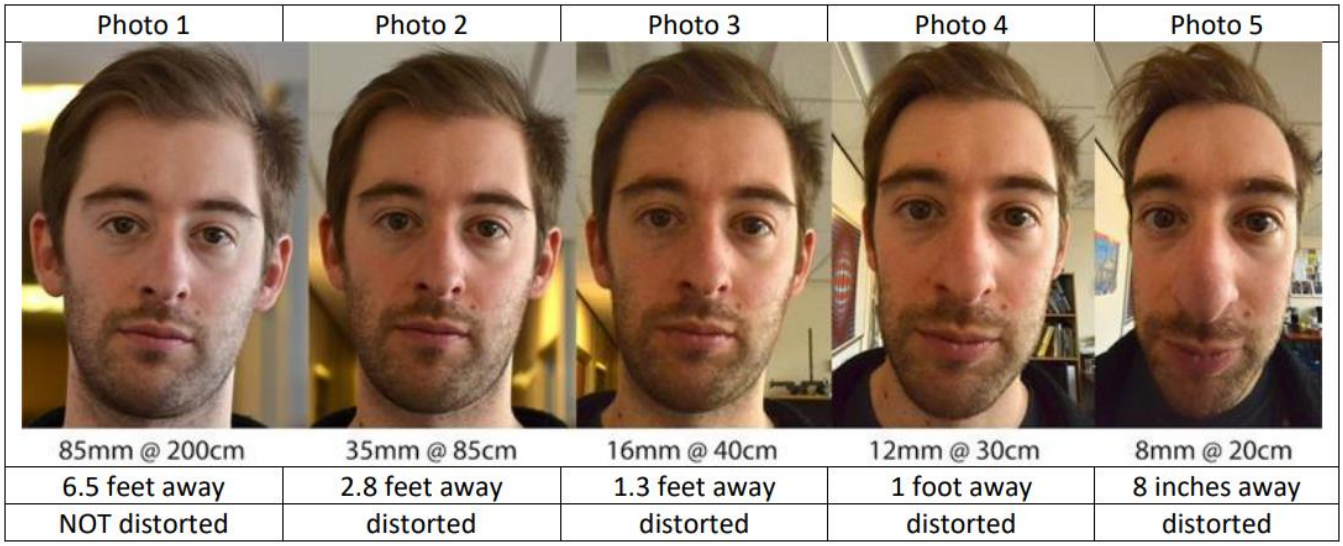


Photo 1	Photo 2	Photo 3	Photo 4	Photo 5
85mm @ 200cm	35mm @ 85cm	16mm @ 40cm	12mm @ 30cm	8mm @ 20cm
6.5 feet away	2.8 feet away	1.3 feet away	1 foot away	8 inches away
NOT distorted	distorted	distorted	distorted	distorted

Fig 11. Photo 1 on the left was taken while standing 6.5 feet (or 200 cm) from the person. The camera zoom was used to zoom in on just the head and neck. This photo reflects how the person truly looks (the photo is NOT distorted). Photos 2-5 become increasingly distorted as the camera is held increasingly closer to the face. Note how the following facial features are becoming distorted: 1. The ears disappear from view. 2. The eyes appear bigger. 3. The nose appears wider and longer. 4. The shape of the face is becoming narrow and long.

How does this distortion impact measuring the facial features with the software? 1. If the software is used to measure a distorted photo, the lengths of the palpebral fissures will be inaccurately smaller than they truly are. The lip may appear thinner than it truly is. (Although the eyes appear bigger in Photo 5 (Fig 11), they measure smaller than they truly are because the ¾ dot, placed between the patient's eyebrows to serve as a ruler in the photo, will also be distorted in size).

Additional Training / Instructional Resources: More detailed pictorial and animated instruction for how to take standardized facial photographs can be obtained from the FASDPN website and the research publications by Astley (2011a, 2015) posted on the website.

Quick Photography Guide: Below is a 1-page Guide for how to take the 3 photos.

Quick Photography Guide

How to Take the Three Photographs

For further instructions go to www.fasdpn.org/htmls/photo-face.htm

Take these 3 photos following the directions below.

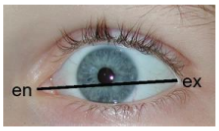
frontal 3/4 view lateral

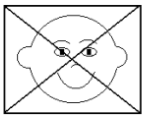
Standardized Photo Set

Photo 1	Photo 2	Photo 3
(Front View)	(Angle View)	(Side View)

Facial Expression

- Place ¾" sticker on forehead between eyebrows.
- Write size of sticker on the sticker
- Eyes wide open (clearly see en and ex)
- No glasses
- NO SMILE
- Lips gently closed
- In Photo 1, have child look straight at you. You should be able to see both ears equally.

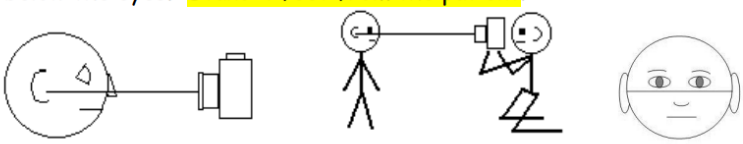




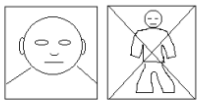
No Smile

Camera Position

- The camera should be directly in front of the face. An imaginary line drawn between the two ear canals should fall just below the eyes. Stand 4 feet from the patient.



- Use zoom on camera to take a close-up picture of just the head, not the whole body.



Yes No

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Camera / Image Resolution Specifications

Digital Camera

The recommended minimum specifications for a digital camera are:

- Flash
- Zoom feature that allows you to fill the camera frame with the facial image.
- It's helpful to have a camera with a fast shutter speed to capture still photos of wiggly children

Image Resolution

In general, an ideal facial image has a resolution of 200 to 300 dpi (dots per inch) or pixels/inch.

Image Formats

This software imports most image formats

- jpeg (.jpg)
- tiff (.tif)
- bitmap (.bmp)
- (.psd)
- (.gif)
- (.png), etc

PART IV. USING THE MEASUREMENT TOOLS, PICTORIAL GUIDES AND SCORING TABLES

Tools and Guides to Measure Facial Features

- Several tools and pictorial guides are provided to help you measure the facial features.
- Select the tools and guides from the TOOLS and GUIDES top drop-down menus.
- An image must be open and visible before a TOOL can be selected.
- Each TOOL and GUIDE are described below.

TOOLS include:

- Pointer for clicking on facial landmarks and tracing the outline of the upper lip.
- Circularity Tool for outlining upper lip thinness.
- Single Distance Tool for measuring the size of the internal measure of scale (paper sticker).
- 3-Distances Tool for measuring the left and right palpebral fissure lengths and the inner canthal distance.
- Tool Options to select the style of the pointer, line color, and the zoom level of the photos.

GUIDES include:

- Picture Guides
  1. 2 Lip-Philtrum Guides (1. Caucasian and 2. African American).
  2. FAS Facial Phenotype provides an example of a child with all 3 FAS facial features.
  3. Rotation Guides document different degrees of rotation up, down, left or right in frontal images.
  4. Landmark/Rotation Guide identifies key facial landmarks and proper image rotation.
  5. Standardized Photo Set Guide provides an example of the frontal, ¾ and lateral photos.
- Table Guides
  1. For interpreting the 4-Digit Code Facial ABC-Scores and Ranks.
  2. Lip-Philtrum tables for interpreting the lip and philtrum 4-Digit Code ranks.

Tools/Options

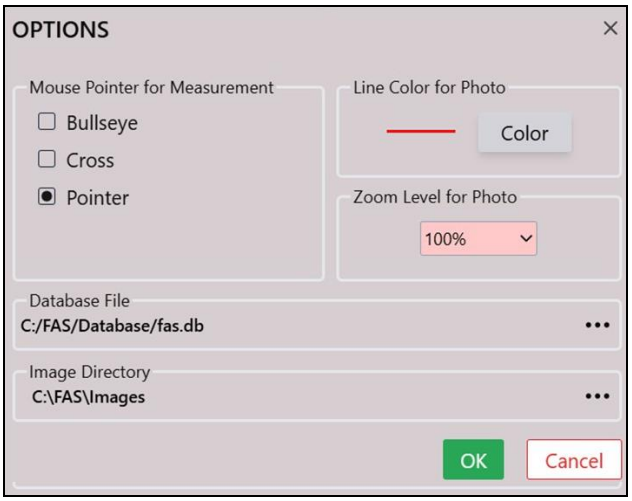


Fig 12. Options menu.

To Use: Select from the Tools drop-down menu from the top menu bar (Fig 12).

The User can select the following options:

- Mouse Pointer style for the Circularity, Single Distance and 3-Distance Tools.
- Line color.
- Default zoom level for the Photos.
- Database name and location where photo analyses will be stored.
- Directory where software will first go to when you ask to browse to open a new photo.

Identifying Key Facial Features

The Landmark/Rotation Guide

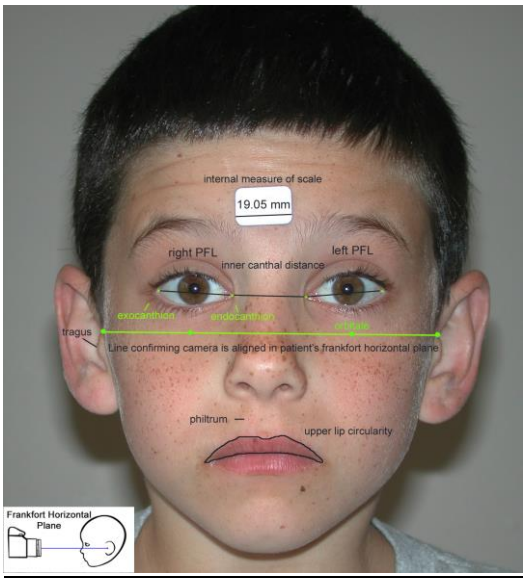


Fig 13. Landmark/Rotation Guide

To view: Select from the Guides drop-down menu on the top menu bar.

This Guide identifies key facial features (palpebral fissure length (PFL), philtrum, upper lip) and landmarks (endocanthion, exocanthion, orbitale, and tragus) used to measure the FAS facial features (Fig 13). The child pictured has a normal facial phenotype. The Guide also provides a pictorial example of the Frankfort Horizontal Plane used to align the camera with the face. More detailed information about image rotation can be found elsewhere in this Instruction Guide.

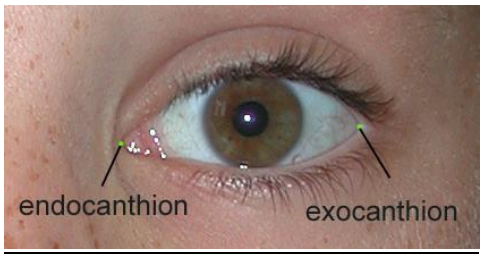


Fig 14. Palpebral Fissure Length (PFL)

The palpebral fissure length (PFL) is defined as the distance from the endocanthion landmark to the exocanthion landmark (Fig 14). The eyes need to be fully open so the eye lashes do not block your view of the exocanthion.

The FAS Facial Phenotype

Fig 15. FAS facial phenotype.

To view: Select from the Guides drop-down menu on the top menu bar.

This young girl presents with the three facial features that are diagnostic of the FAS facial phenotype (small eyes, smooth philtrum and a thin upper lip) (Fig 15).

Measuring the Internal Measure of Scale

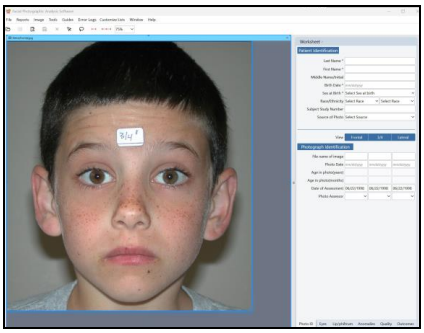


Fig 16. Blue Frontal button clicked to bring frontal photo into view.

To use: Once photos are imported per instructions below, click on the blue Frontal button to bring the frontal photo to the surface (Fig 16). Click on the *Eyes* tab on the bottom of the Worksheet. Select a normal PFL chart. Select a "Real Scale Length". Click on the "Length of Scale in Photo" cell to turn it pink (activate it). Click on the Single-Distance icon (Fig 17) on the top menu bar. This tool measures the length of the sticker on the forehead. Click and release the left mouse button on point A and click and release the left mouse button on point B (Fig 18). A straight line will be drawn on the photo as an overlay. The sticker length, in units of pixels, will automatically fill into the pink Worksheet cell.
When measuring the internal measure of scale, its horizontal length should be measured, not its vertical height. The line drawn across the sticker should be horizontal to the top and bottom borders of the sticker.

The Single-Distance Tool

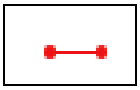


Fig 17. Single-Distance Tool Icon

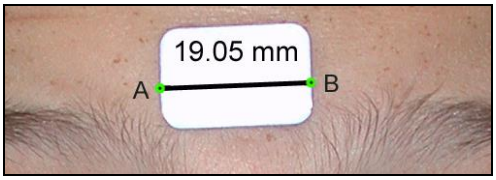


Fig 18. Measuring the horizontal length of the internal measure of scale. The sticker serves as a "ruler" in the photo.

Measuring PFLs and Inner Canthal Distance

The 3-Distance Tool

Fig 19. 3-Distances Tool Icon

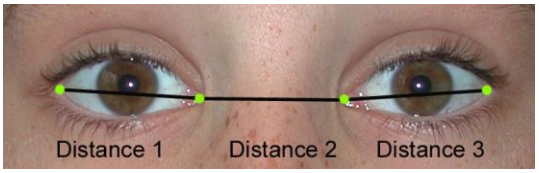


Fig 20. With the 3-Distances Tool, you can measure these 3 distances (the subject's Right PFL, Inner Canthal Distance and Left PFL) with the following 4 mouse-clicks on the subject's R. exocanthion, R. endocanthion, L. endocanthion and L. exocanthion.

To use: Click the blue Frontal button to bring the frontal photo in view. Zoom the photo to make sure the sticker and both eyes are fully visible. Click on the 3-Distances icon (Fig 19) from the top menu bar. This tool measures three distances (R. PFL, Inner Canthal Distance and L. PFL) with 4 mouse clicks (Fig 20). When the tool is selected, the Worksheet cell for R. PFL in pixels is automatically highlighted pink (activated). Click and release the left mouse button on the patient's R. exocanthion, R. endocanthion, L endocanthion and L exocanthion, in that order. You will see a line following your clicks. As you move the mouse from one position to the next, you will see the numbers in the cells increase as the length of the line increases. The mm and zscore measures will automatically fill in if the birth date, photo date, sex, PFL normal chart, real scale length and length of scale in photo data is filled in.

Measuring Lip Thinness

The Circularity Tool

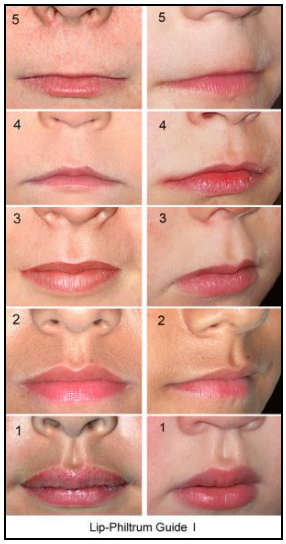
Fig 21. Circularity Tool icon.

Fig 22. An example of the upper lip outlined to compute circularity. This is the most accurate method for measuring/ranking upper lip thinness.

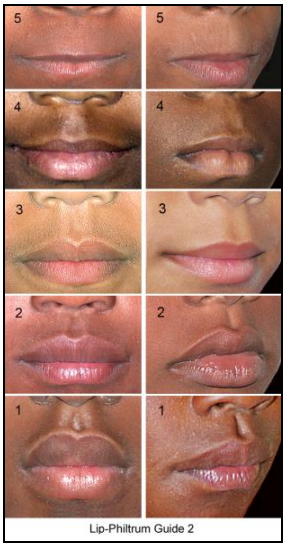
To use: Click on the Lip/philtrum tab on the bottom of the Worksheet. Select a Lip-Philtrum Guide from the drop-down menu. Click the left mouse button on the blue frontal button to bring the frontal photo in view. Position the photo and zoom it to enlarge the view of the lips. Click on the Circularity Icon (Fig 21) from the top menu bar.

This tool measures the circularity (or thinness) of the upper lip in the frontal photo. Circularity = perimeter^2/area. The thinner the upper lip, the bigger the circularity number. When the tool is activated, the user clicks on the patient's right corner of the upper lip and outlines the upper lip while holding the left mouse button down (Fig 22). The left mouse button is released when the outline is complete. Circularity is automatically computed, inserted into the Upper Lip Circularity cell and assigned a Rank based on the Lip Circularity Tables described below (Fig 23).

The Lip-Philtrum Guides



Guide 1



Guide 2

To use: Two pictorial Guides are available (Figs 23A,B). Guide 1 is used for Caucasians and all other races with thinner lips similar to Caucasians. Guide 2 is used for African Americans and all other races with thicker lips like African Americans.

These guides serve as pictorial 5-point Likert Scales for ranking upper lip thinness. The circularity of each lip pictured is printed in a Table for each Guide. The range of circularity for each 5-point Rank is printed in the Lip Circularity Tables. Note the circularity ranges differ by race.

The most accurate measure of lip thinness is obtained using the circularity tool.

Lip Rank	Lip Circularity	
	Pictured	Range
5	178	≥ 131.5
4	85	75.5 to 131.4
3	65	57.5 to 75.4
2	50	42.5 to 57.4
1	35	≤ 42.5

Table for Lip-Philtrum Guide 1. Fig 23A

Lip Rank	Lip Circularity	
	Pictured	Range
5	80	≥ 62.1
4	57	52.1 to 62.0
3	39	30.1 to 52.0
2	29	27.5 to 30.0
1	25	≤ 27.5

Table for Lip-Philtrum Guide 2. Fig 23B

Measuring Philtrum Smoothness

The Lip-Philtrum Guides

Fig 24. Guides for ranking lip thinness and philtrum smoothness.

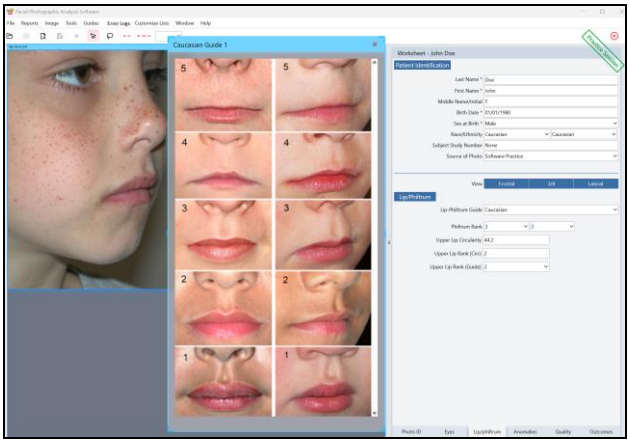


Fig 25. The Lip-Philtrum Guides can be opened and moved around across the top of the facial image.

To use: Click on the ¾ blue button on the Worksheet to bring the ¾ photo in view. Select the Lip-Philtrum Guide from the Guides/Picture Guides top menu bar (Fig 24). When displayed, place the mouse cursor on the guide and hold the left button down to drag the Guide over the surface of the 3/4 facial photograph.

The guides provide a pictorial 5-point Likert Scale for visually ranking philtrum smoothness. The user selects the philtrum that best matches the philtrum in the patient's ¾ facial photograph. The rank of the philtrum is printed on the left. The facial images can be zoomed up or down to match the size of the lip-philtrums in the Lip-philtrum Guides (Fig 25).

The philtrum is most accurately ranked from the ¾ view photo.

Note that there are two Lip-Philtrum Guides (1&2) (Fig 24). The philtrum ranks are identical between the two Guides. In other words, the Rank 3 philtrum pictured in Guide 1 is the same depth as the Rank 3 philtrum pictured in Guide 2.

A Rank 5 philtrum is <u>completely</u> smooth. A Rank 4 philtrum is a <u>barely</u> visible indentation that typically must be viewed at an angle to detect. Go to our fasdpn.org website for additional photo examples of Rank 4 and 5 philtrums. A Rank 3 philtrum is the population mean. A Rank 1 philtrum is extremely deep with very prominent philtral ridges. A Rank 2 philtrum is intermediate between a Rank 3 and Rank 5 philtrum.

Lip thinness and philtrum smoothness are measured independently of one another. In other words, an individual can have a Rank 5 upper lip with a Rank 1 philtrum.

Guide for Scoring the FAS Facial Phenotype

The following Tables are used to derive the facial ABC-Score and the 4-Digit Code Face Rank ((Astley) Hemingway, 2024). These Tables serve as the case-definitions used to describe the full continuum of expression of the FAS facial features. The FAS Facial Analysis Software is programmed to automatically Rank the facial features based on the criteria portrayed in these tables.

The User can view these tables by going to the Guides drop-down menu in the top menu bar. The User does not need to refer to these Tables to score the facial phenotype. The software automatically generates an ABC-Score and 4-Digit Diagnostic Code rank for the face when the user measures the palpebral fissure lengths, philtrum smoothness and upper lip thinness. These scores are presented at the end of the Worksheet under the OUTCOME tab.

Table 1A. Deriving the ABC-Score for the Face

The first step in deriving the 4-Digit Code rank for the facial phenotype is to derive the facial ABC-Score. For example, if a patient's palpebral fissure lengths were 2 or more standard deviations below the norm (≤ -2 SD) and their philtrum and upper lip received Likert scores of 2 and 3 respectively, the facial phenotype would receive an ABC-Score of **CAB**.

5-Point Likert Scale for Philtrum & Lip	Z-score for largest Palpebral Fissure Length	Circle the ABC-Scores for: Palpebral Fissure	Philtrum	Upper Lip
4 or 5	≤ -2 SD	**C**	C	C
3	>-2 SD and ≤ -1 SD	B	B	**B**
1 or 2	> -1 SD	A	**A**	A

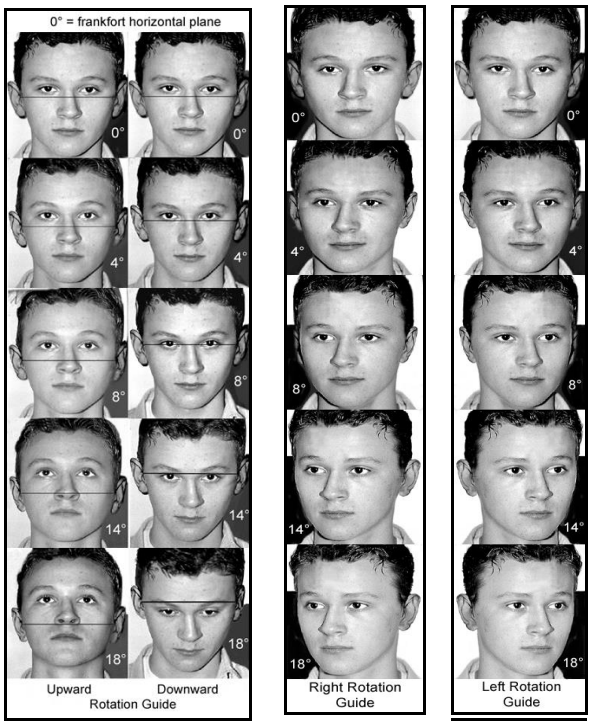
Table 1B. Deriving the 4-Digit Diagnostic Code Rank for the Face.

The final step is to convert the ABC-Score for Facial Phenotype to a 4-Digit Diagnostic Code Rank. A **CAB** score translates into a 4-Digit Diagnostic Code rank of **2.** This rank would serve as the second digit in the 4-Digit Diagnostic Code.

4-Digit Diagnostic Code Rank	Level of Expression of FAS Facial Phenotype	Palpebral Fissure - Philtrum - Lip ABC-Score Combinations
4	Severe	CCC
3	Moderate	CCB, CBC, BCC
2	**Mild**	CCA, CAC, CBB, CBA, **CAB**, CAA BCB, BCA, BBC, BAC ACC, ACB, ACA, ABC, AAC
1	Absent	BBB, BBA, BAB, BAA ABB, ABA, AAB, AAA

Documenting the Rotation of the Facial Image

The Rotation Pictorial Guides



Up is (+)
Down is (-)
Fig 26

Right is (+)

Left is (-)

To view: Select a rotation guide from the GUIDES drop-down menu on the top menu bar (Fig 26). When displayed, place the mouse cursor on the guide and hold the left button down to drag the Guide over the surface of the frontal facial photograph.

These rotation guides were obtained by placing the subject in a stereotaxic device to achieve accurate measures of rotation in degrees. The most accurate measures of facial features are made from a facial photo that has no up, down, right or left rotation. These guides help you document the magnitude of rotation that may exist in the photographs. The more rotation, the less accurate the facial measures.

Frontal Image: Ranking Up/Down Rotation

To rank the number of degrees the face in the frontal image is rotated up or down from the Frankfort Horizontal Plane, use the single-distance tool to draw a line from the top of the right tragus to the top of the left tragus in the patient's frontal photograph (Fig 27). Compare the position of this line to the position of the lines drawn on the facial images in the Up/Down Rotation Guide. As the face is rotated up the line moves down toward the tip of the nose. As the face is rotated down the line moves up toward the eyebrows. Record your best estimate of the number of degrees of rotation up or down in the proper cell in the Worksheet. You may type in any degree of rotation from -45 to +45 in the cell. You are not restricted to the 5 levels of rotation presented in the Guide.

Frontal Image: Ranking Left/Right Rotation

Use these guides to assist you in judging the number of degrees the subject's head is rotated to their right (+) or their left (-). Record your best estimate of the number of degrees of rotation right or left in the proper cell in the Worksheet. You may type in any degree rotation from -45 to +45 in the cell. You are not restricted to the 5 levels of rotation presented in the Guide.

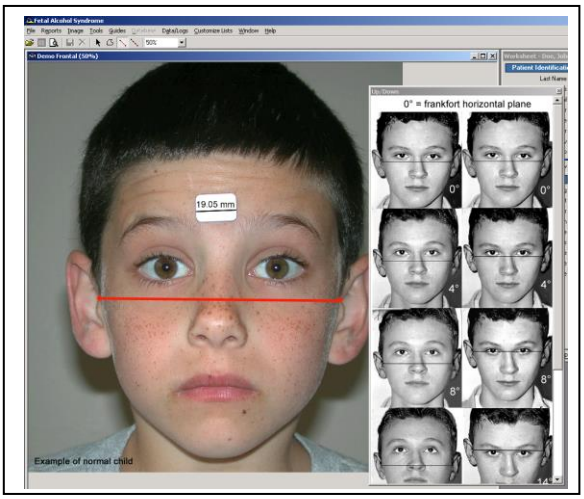


Fig 27. Using the up/down rotation guide.

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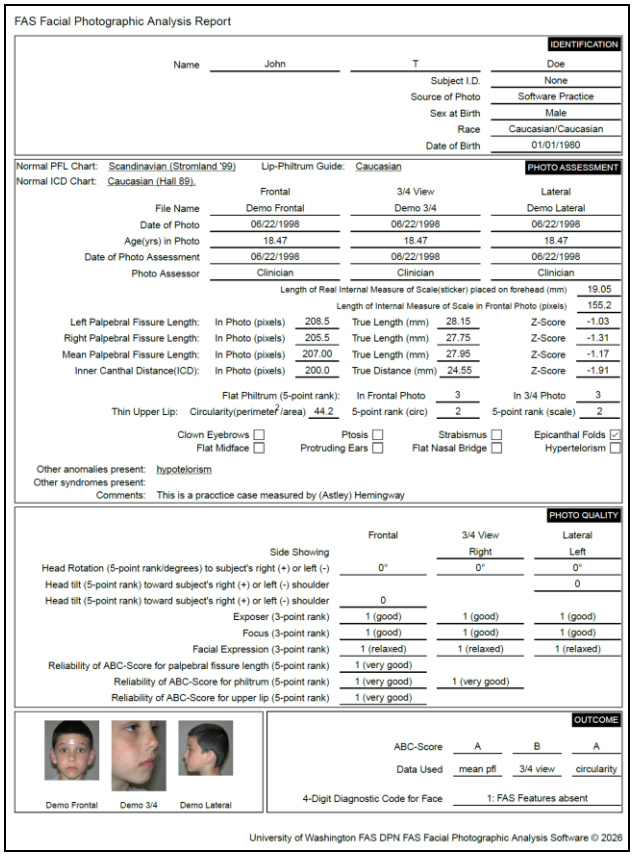
PART V. HOW TO MEASURE A SET OF PHOTOS: FROM START TO FINISH

Example of a Complete Analysis and Outcome Report

Fig 28. Example of high-quality photos used to produce the outcome report in Fig 29.

A demonstration/practice case called "John Doe" is provided with the software (Figs 28 & 29). The photo set in Fig 28 serves as an example of high-quality photos that meet all criteria necessary to generate accurate facial measures (e.g., proper rotation, exposure, focus, relaxed facial expression). The 1-page outcome report (Fig 29) is produced by the software upon completion of the photo analyses.



FAS Facial Photographic Analysis Report

IDENTIFICATION

Name	John	T	Doe
Subject I.D.			None
Source of Photo			Software Practice
Sex at Birth			Male
Race			Caucasian/Caucasian
Date of Birth			01/01/1980

PHOTO ASSESSMENT

Normal PFL Chart: Scandinavian (Stromland '99) Lip-Philtrum Guide: Caucasian
Normal ICD Chart: Caucasian (Hall 89).

	Frontal	3/4 View	Lateral
File Name	Demo Frontal	Demo 3/4	Demo Lateral
Date of Photo	06/22/1998	06/22/1998	06/22/1998
Age(yrs) in Photo	18.47	18.47	18.47
Date of Photo Assessment	06/22/1998	06/22/1998	06/22/1998
Photo Assessor	Clinician	Clinician	Clinician

Length of Real Internal Measure of Scale(sticker) placed on forehead (mm) 19.05
Length of Internal Measure of Scale in Frontal Photo (pixels) 155.2

Left Palpebral Fissure Length:	In Photo (pixels)	208.5	True Length (mm)	28.15	Z-Score -1.03
Right Palpebral Fissure Length:	In Photo (pixels)	205.5	True Length (mm)	27.75	Z-Score -1.31
Mean Palpebral Fissure Length:	In Photo (pixels)	207.00	True Length (mm)	27.95	Z-Score -1.17
Inner Canthal Distance(ICD):	In Photo (pixels)	200.0	True Distance (mm)	24.55	Z-Score -1.91

Flat Philtrum (5-point rank):		In Frontal Photo	3	In 3/4 Photo	3
Thin Upper Lip:	Circularity(perimeter²/area)	44.2	5-point rank (circ)	2	5-point rank (scale) 2

Clown Eyebrows ☐ Ptosis ☐ Strabismus ☐ Epicanthal Folds ☑
Flat Midface ☐ Protruding Ears ☐ Flat Nasal Bridge ☐ Hypertelorism ☐

Other anomalies present: hypotelorism
Other syndromes present:
Comments: This is a practice case measured by (Astley) Hemingway

PHOTO QUALITY

	Frontal	3/4 View	Lateral
Side Showing		Right	Left
Head Rotation (5-point rank/degrees) to subject's right (+) or left (-)	0°	0°	0°
Head tilt (5-point rank) toward subject's right (+) or left (-) shoulder			0
Head tilt (5-point rank) toward subject's right (+) or left (-) shoulder	0		
Exposer (3-point rank)	1 (good)	1 (good)	1 (good)
Focus (3-point rank)	1 (good)	1 (good)	1 (good)
Facial Expression (3-point rank)	1 (relaxed)	1 (relaxed)	1 (relaxed)
Reliability of ABC-Score for palpebral fissure length (5-point rank)	1 (very good)		
Reliability of ABC-Score for philtrum (5-point rank)	1 (very good)	1 (very good)	
Reliability of ABC-Score for upper lip (5-point rank)	1 (very good)		

Demo Frontal Demo 3/4 Demo Lateral

OUTCOME

ABC-Score	A	B	A
Data Used	mean pfl	3/4 view	circularity

4-Digit Diagnostic Code for Face 1: FAS Features absent

University of Washington FAS DPN FAS Facial Photographic Analysis Software © 2026

Fig 29. John Doe Outcome Report

To View: Select File/Open/Existing Subject File from the top menu bar. Click on the Action folder icon for John Doe. The frontal, ¾ and lateral facial photos and completed Worksheet will appear for your review and practice. To view John Doe's Report (Fig 29), select Reports from the top menu bar. Check the box for the subject named John Doe. Click Preview. To print or save the Report, click Print or Save as PDF. You can also open the Report by clicking "Preview or print the outcome report" in the Outcomes tab.

All data for John Doe's photo analysis is write-protected so you cannot save any changes you make to the Worksheet or Report.

This John Doe case also serves as a practice case for you. See below for more detailed instructions on how to use this Sample Case as a Practice Case.

To Open a New Patient's Photos and Worksheet

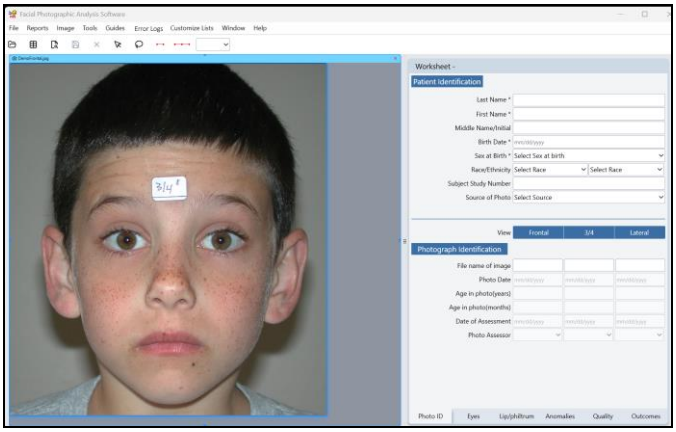


Fig 30. New patient photos open on the left, worksheet opens on the right.

Before you start an analysis, go to page 5 for instructions on how to open the software, how to establish a database to store your facial analyses and how to customize options like line colors, pointer types, zoom levels.

Transfer the facial photos from your camera to your computer. Review your photos to identify the 3 best photos for analysis (frontal, ¾ and lateral views). The software will only allow you to import 3 photos for analysis.

To Open a New Patient's Photos: Select File/Open/Photos from the top menu bar. Navigate through your hard drive to locate the photos you want to measure. **Hold the control key down and select the 3 photos you want to measure.** The 3 photos will open in the left window (one on top the other) and a blank Worksheet will automatically open in the right window (Fig 30). The Worksheet will not appear if a photo is not open.

Typically, you will be analyzing a set of 3 photos (frontal, ¾, and lateral) for each patient. **Open all three photos at one time before beginning the analysis.** You can toggle between the three opened photos by clicking on "Window" in the top menu bar and clicking on the image filename you want to view. More efficiently, once the file names of the 3 photos are entered into the Photo ID tab of the Worksheet, you can click on the blue View banner in the Worksheet labeled Frontal, ¾ and Lateral, just below the Patient Identification section, to view each photo. Instructions for how to link the photos to the blue View buttons are presented below.

Enhancing the Image

Image/Image Adjustments
Brightness, Contrast, Rotation

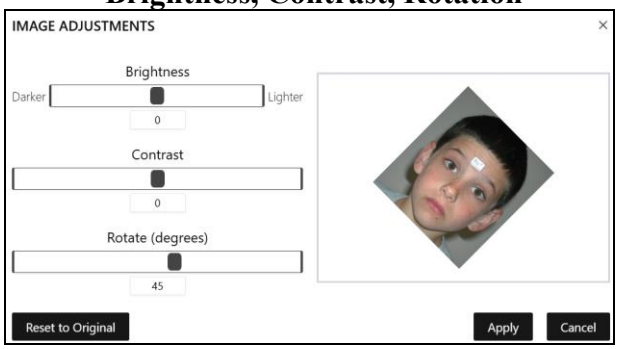


Fig 31. Image adjustment options.

Image/Zoom

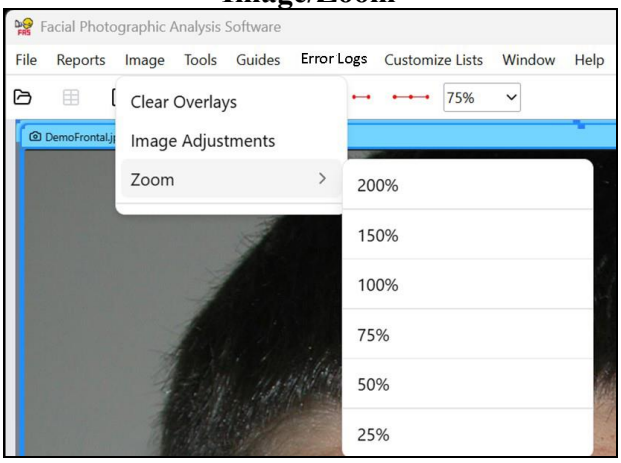


Fig 32. Zoom options

Image/Clear Overlays

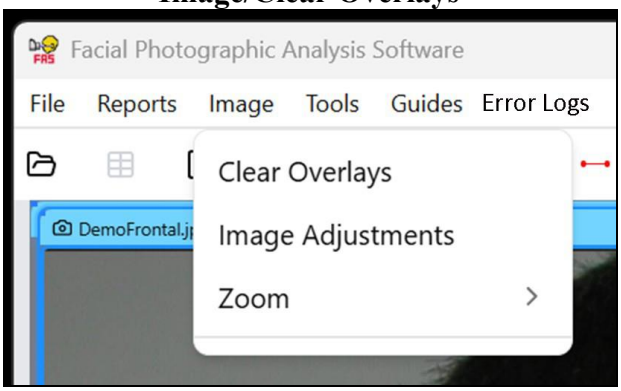


Fig 33. Clear distance and circularity overlays drawn on the image

***To Enhance the image**:* Bring the image to the surface by clicking on *Window* in the top menu and clicking on the name of the photo. Select Image / Image Adjustments from the top menu bar.

To ***adjust the brightness, contrast or rotation*** of an image, either slide the control bar from left to right, left-click on the arrows at either end of the slide or type in a positive or negative number in the box below the slide. Click Apply to apply the adjustments (Fig 31).

To ***move the image up and down***, click on the image and roll the mouse wheel up and down. You can also move the scroll bars up and down. To ***move the image left and right***, hold the shift key down and roll the mouse wheel up and down. You can also move the scroll bars left and right.

***To enlarge or reduce the image**:* Bring the image to the surface. Select Image/Zoom from the top menu bar to select a zoom % from the drop-down list (Fig 32). You can also click on the photo, hold the CTRL key down while rolling the mouse wheel up to enlarge or down to reduce the zoom level.

***To clear overlays**:* Bring the image to the surface. Select Image/Clear Overlays *fr*om the top menu bar (Fig 33). All distance and circularity measurements drawn on the image as temporary overlays will be removed. Clearing overlays will not clear the data.

Measuring a Patient's Photos.

Entering the Patient Identification Information into the Worksheet Photo ID tab.

See a video demonstration of John Doe's photos being measured with the Software on www.fasdpn.org.

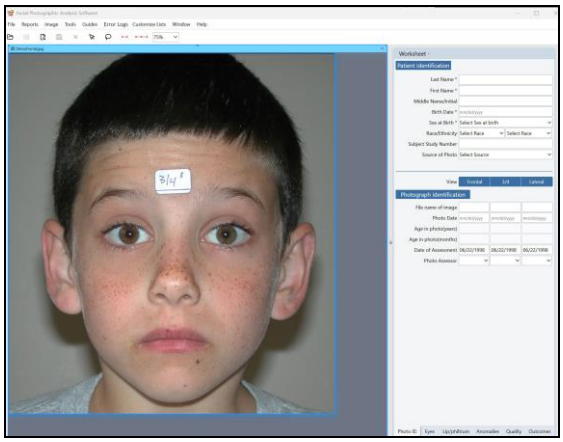


Fig 34. New patient photos and worksheet are opened.

Patient Identification Section of Worksheet

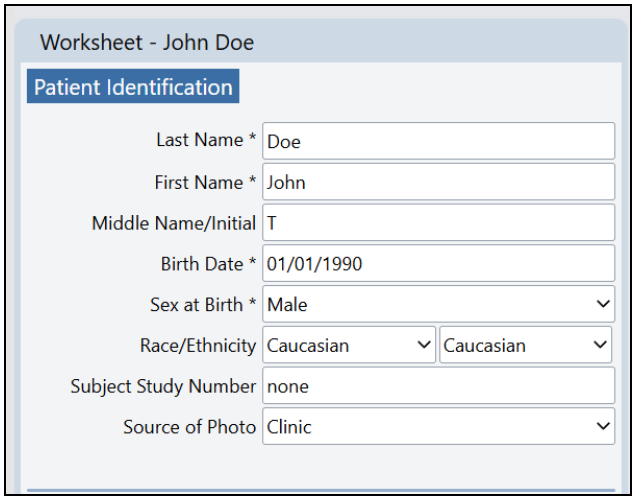


Fig 35. Patient Identification window in the Worksheet Photo ID tab.

To View: Once you have opened a patient's photos, the photos and a Worksheet will appear (Fig 34).

When the 3 patient photos are opened, the photos will appear one on top of the other on the left side of the window and a blank Worksheet will open on the right side of the window (Fig 34) open to the Photo ID tab.

The first section of the worksheet is labeled: Patient Identification. (Fig 35)

Complete the information by either typing directly into the cells or selecting drop-down menus with the down-arrow. The cells marked with an * are required before a worksheet can be saved.

Dates: All dates MUST be entered as mm/dd/yyyy or mmddyyyy to allow correct computation of the patient's age.

Race: Each patient is identified by two races (one for each parent). For example, if both parents are Caucasian, race would be coded Caucasian, Caucasian. If one parent is Caucasian and one is Black, race would be coded Caucasian, Black. Additional races can be added to the drop-down lists by selecting the Customized Lists button on the top menu bar. If a parent is multiracial, you can add a new race to reflect that (e.g., Black/Asian)

Source of Photo: You may want to document the source of the photo (i.e., clinic, research, etc). You can customize the Source of Photo list by selecting the Customized Lists button on the top menu bar.

Entering the Photo Identification information into the Worksheet Photo ID tab

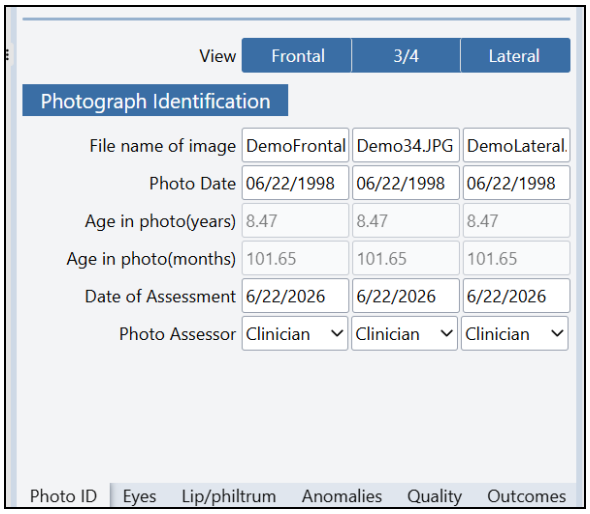


Fig 36. Once the 'File Name of Image' is entered into the cells for the frontal, ¾ and lateral images, you can click on the BLUE Frontal, ¾ and Lateral View buttons shown above to view each of those images or toggle back and forth between them.

To View: Select the Photo ID tab at the bottom of the Worksheet. (Fig 36)

Photo View: The information requested for the frontal, ¾ and lateral images are presented in the 1st, 2nd and 3rd columns respectively.

File name of image: This is the name you assigned to the digital facial image. The name of the image file will automatically fill into the cell by bringing the photo to the surface, clicking on the photo and then clicking on the cell labeled 'File name of image'. An expedient way to enter the filenames automatically into the 'File name of image' cells is to 1) bring the frontal image to the surface, click on the photo and click on the 'File Name of image' cell for the frontal image. Repeat the same process for the ¾ and lateral images.

Photo Date: This is the date the photo is taken. This date will be used to automatically compute the age of the patient in the photo from the patient's birth date. The date MUST be entered as mm/dd/yyyy or mmddyyyy.

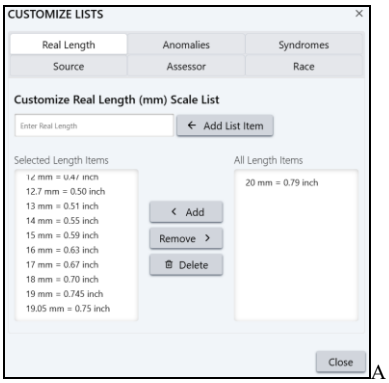
Age in Photo: Age in years and months are grayed out to indicate they will be automatically computed when the birth date and photo date are entered.

Date of Assessment: This is the date the photograph is being analyzed. The date MUST be entered as mm/dd/yyyy or mmddyyyy.

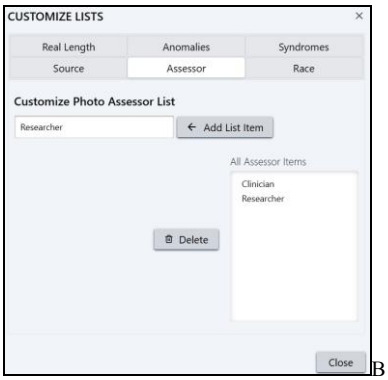
Photo Assessor: This is the name of the person analyzing the photo. This drop-down list can be customized by selecting Customized Lists from the top menu bar.

Quick Tip: If the photo date, date of assessment and photo assessor are the same for each image, enter this information for the frontal image, then just click on the Photo Date cell for the ¾ and lateral images and all information from Photo Date to Photo Assessor will automatically fill into the cells.

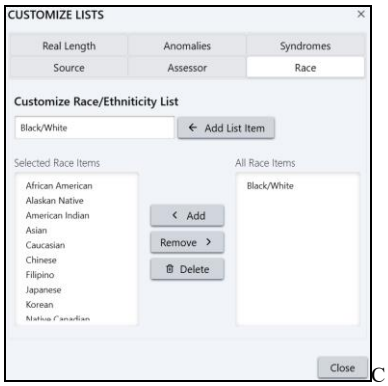
Customizing Dropdown Lists



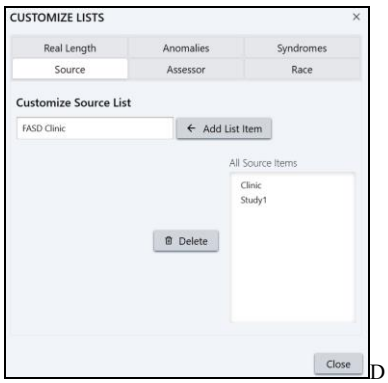
A



B



C



D

Fig 37. Customize Lists

To View: Select "Customize Lists" from the top Menu Bar.

Each of the following lists can be updated to include additional entries.

- Real Length of the internal measure of scale (sticker)
- Anomalies
- Syndromes
- Source of image
- Assessor of image
- Race/ethnicity of subject

To update a list,

1. Click on the appropriate Tab (Lets use Real Length as an example (Fig 37A)).
2. Type in the new entry in the cell next to "Add List Items". We typed in the phrase "20 mm = 0.79 inch".
3. Click on the "Add List Item" button. This will add "20 mm = 0.79 inch" into the list of "Selected Lengths".
4. Click on the "Close" button.

Eyes Tab on the Worksheet Measuring the PFLs

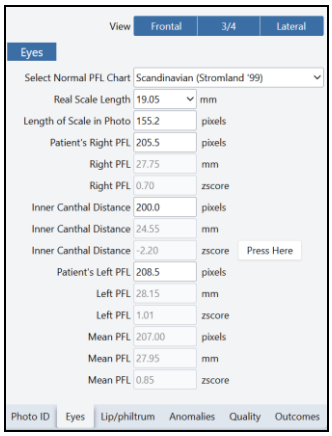


Fig 38. When the Caucasian, Canadian, or Scandinavian Normal PFL Charts are selected, the z-score for Inner Canthal Distance (ICD) is computed using the Hall (1989) normal charts. Z-scores require birth date, photo date, and sex to be entered because all z-scores are age dependent and most are sex dependent.

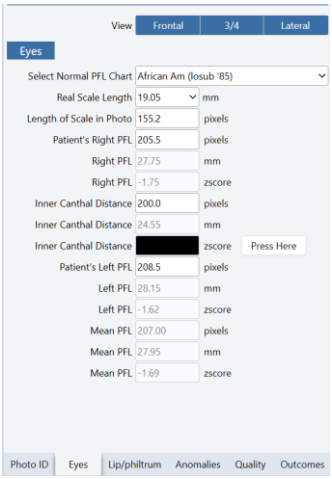


Fig 39. When the African American Normal PFL Chart is selected, PFL z-scores require birth date, photo date, and sex to be entered. Inner Canthal Distance z-scores are not available for African Americans.

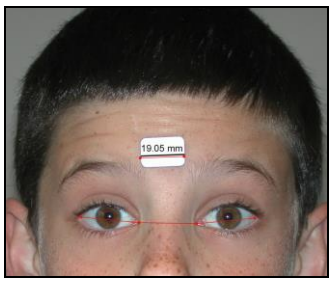


Fig 40. Red lines overlayed on image when single distance and 3 distances tools are used.

To View: Select the Eyes tab at the bottom of the Worksheet. All eye measurements are obtained from the frontal image.

Only data cells with white backgrounds are to be filled in by the User. Click the mouse cursor in a white cell to enter data. It will turn pink to designate it is the active cell. Grayed-out cells (e.g., Right PFL mm) are computed and filled in automatically by the software (Fig 38).

Select Normal PFL Chart: Select the PFL chart that best matches the most predominant race of the patient. This selection determines which normal PFL chart is used to compute PFL z-scores. Three PFL charts are available in Version 3: Canadian (Clarren et al., 2010), Scandinavian (Stromland et al., 1999), and African American (Iosub et al., 1985). See our website (fasdpn.org) for guidance on which PFL charts to use. The Hall et al. (1989) innercanthal distance charts are automatically used on all races except African American. There currently are no ICD charts available for African Americans.

Real Scale Length: Select the real length of the internal measure of scale (sticker) placed on the patient's forehead. We recommend a sticker that is ¾ inch (or 19.05 mm) in width or diameter.

Length of Scale in Photo: This is the horizontal length of the sticker measured in units of pixels using the Single-Distance tool. First click on the image, then click on the Single-Distance Tool, then click on the Length of Scale in Photo cell (it will turn pink when selected), then measure the length of the sticker. See directions above under Single-Distance Tool (Fig 39).

The remaining three data fields are measured using the 3-Distances Tool.

Patient's Right PFL: ___ (pixels)
Inner Canthal Distance: ___ (pixels)
Patient's Left PFL: ___ (pixels)

When this tool is selected, data will automatically enter into the R. PFL, Inner Canthal Distance and L. PFL cells in that order, thus they must be measured in that order. With the left mouse button, click on the patient's R. exocanthion, R. endocanthion, L. endocanthion and L. exocanthion in that order. A red line will appear between clicks (Fig 40). The gray cells will compute automatically based on the birth date, photo date, sex, PFL chart and Scale length.

Lip / Philtrum
Tab on the Worksheet

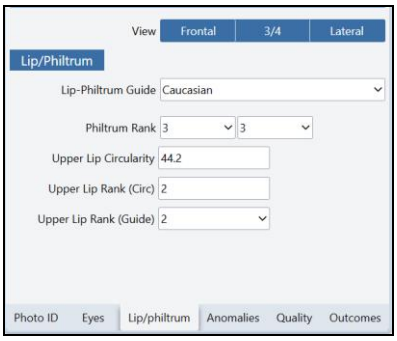


Fig 41. Lip/Philtrum Tab.

Fig 42A. Guide 1

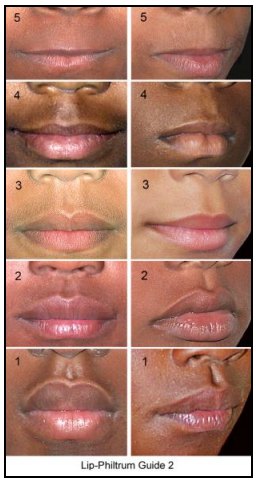


Fig 42B. Guide 2

To View: Select the Lip/Philtrum tab at the bottom of the Worksheet (Fig 41). The information requested for the frontal and ¾ images are presented in the 1st and 2nd columns respectively. You can conveniently view the frontal, ¾ and lateral images by clicking on the blue frontal, ¾ and lateral View buttons.

Lip-Philtrum Guide (Race): Use the drop-down menu to select which Lip-Philtrum Guide is most appropriate to use based on the subject's racial phenotype(s). Guide 1 is for Caucasians and all races with thinner lips like Caucasians. Guide 2 for African Americans and all races with thicker lips similar to African Americans (Fig 42A,B).

Philtrum Smoothness: Open a Lip-Philtrum Guide by clicking on *Guides* in the top menu bar. Use this Guide to select which rank on the 5-Point Scale best matches the philtrum smoothness in the patient's frontal and ¾ photos. Philtrum smoothness is most accurately measured from the ¾ view photo. Assign the same philtrum rank for the ¾ and frontal photos. You can move the Guide across the patient's photos by placing the mouse cursor on the Guide and holding the left mouse button down and dragging.

Upper Lip Circularity: Upper lip thinness is most accurately measured using the Circularity Tool. Open the Circularity Tool from the top menu bar and measure lip circularity in the frontal photo as instructed above under the Lip Circularity Tool. The circularity of the lip will automatically enter into this field.

Lip thinness is ranked on a 5-Point scale. There are two ways to achieve this: 1) compute the rank automatically from the circularity or 2) judge the rank based on the best pictorial match on the Lip-Philtrum Guide. You will have the option of selecting which method you want to use for ultimately scoring the face under the Outcome Tab. Lip circularity provides the most accurate measure of lip thinness (lip rank).

Upper Lip Rank (circularity): The Rank of the upper lip thinness will be automatically computed from the circularity measure and entered into this grayed-out cell. The Rank will be based on which racial Lip-Philtrum Guide you selected. Note, if you toggle between the two Guides, the Rank based on circularity will update to reflect which Guide is selected.

Upper Lip Rank (guide): Use the Lip-Philtrum Guide to select which picture on the 5-Point Scale best matches the lip thinness in the patient's photograph. We recommend using circularity instead.

Other Anomalies / Syndromes Tab on the Worksheet

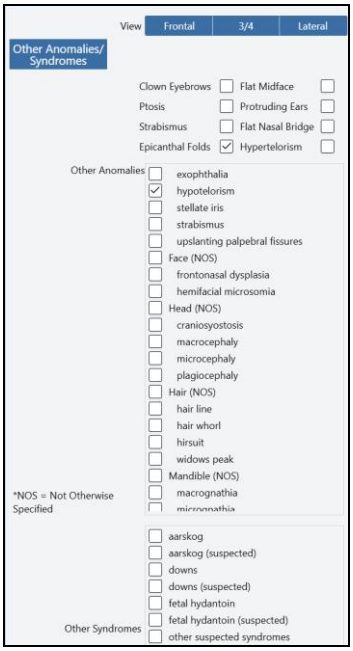


Fig 43. Record which anomalies/syndromes are present in an individual subject.

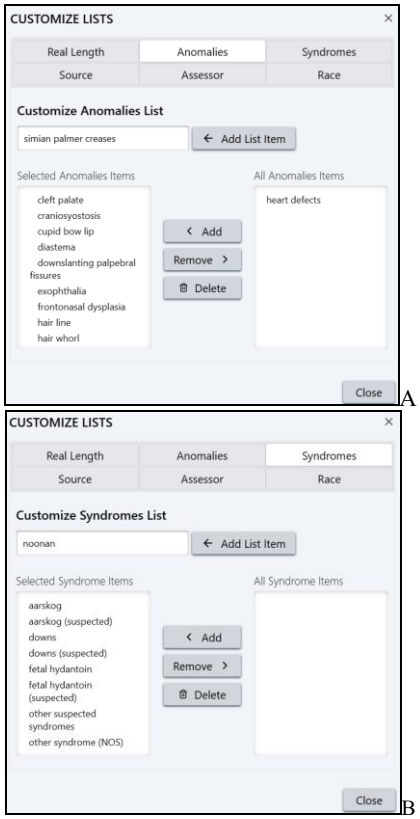


Fig 44. To add new anomalies or syndromes to the list presented under the Anomalies Tab in the Worksheet.

To Use: Select the Anomalies tab at the bottom of the Worksheet (Fig 43).

Anomalies: Place a ✓ in the box next to the anomaly(ies) the patient presents with. This list can be customized to include additional anomalies. Go to Customized Lists on the top menu bar and select the Anomalies tab (Fig 44A, B). The additional anomalies you add to the customized list will appear at the end of the Other Anomalies List in the Worksheet. Hypertelorism will automatically get checked if the z-score for the inner canthal distance is ≥ + 2.0.

Syndromes: Place a ✓ in the box next to any other syndromes that are known or suspected to be present. This list can be customized to include additional syndromes. Go to Customized Lists on the top menu bar and select the Syndromes Tab. The additional syndromes you add to the customized list will appear in alphabetical order in the Other Syndromes list on the Worksheet.

Note: Documenting the presence of other anomalies and syndromes does not alter the measures obtained for the PFL, lip and philtrum. Its important to document all anomalies and/or syndromes, not just those believed to be associated with prenatal alcohol exposure.

Photo Quality Tab on the Worksheet

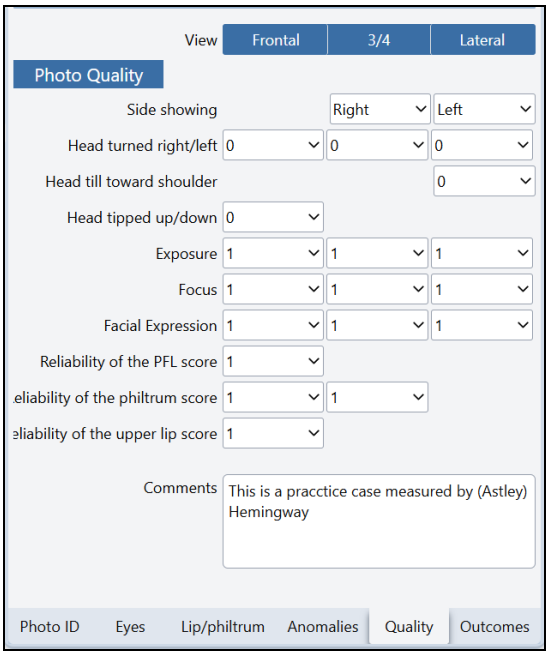


Fig 45. Documenting the quality of the 3 facial photographs.

To View: Select the Quality tab at the bottom of the Worksheet (Fig 45).

Photo Quality

The quality of a photo will impact the accuracy of the facial measures. The quality of the photo should be taken into consideration when rendering a clinical decision. Photos of poor quality should not be used.

It is recommended that you take some practice photos of a person with widely varying quality (severe rotation, big smile, eyes not fully open, etc.) and compare the measures you obtain from those photos with the measures you obtain from a high-quality photo of the same individual. This will demonstrate how poor-quality photos can impact measurement accuracy.

Photo View: The information requested for the frontal, ¾ and lateral images are presented in the 1st, 2nd and 3rd columns respectively. Not every column requires information.

Side Showing: Record whether the right or left side of patient's face is showing in the ¾ and lateral photos.

Head Turned Right / Left in Frontal Image: Use the drop-down menu to record how many degrees the patient's face is rotated toward their right (+) or left (-) in the frontal photo. Use the Right and Left Rotation Pictorial Guides to assist you. You may type in any whole number degree rotation from –45 through +45.

Head Turned Right / Left in ¾ Image: Use the drop-down menu to record how much (on a 5-point scale) the patient's face is rotated toward their right (+) or left (-) in the 3/4 photo. There is no pictorial guide to assist you. Mild rotation implies the amount of rotation present will have only a small impact on the accuracy of the measures obtained from that image. Severe rotation implies the amount of rotation present will have a marked impact on the accuracy of the measures obtained from that image. A ¾ view photo that is rotated too far right or left could impact your ability to accurately measure the smoothness of the philtrum.

Photo Quality Tab on the Worksheet

(Continued)

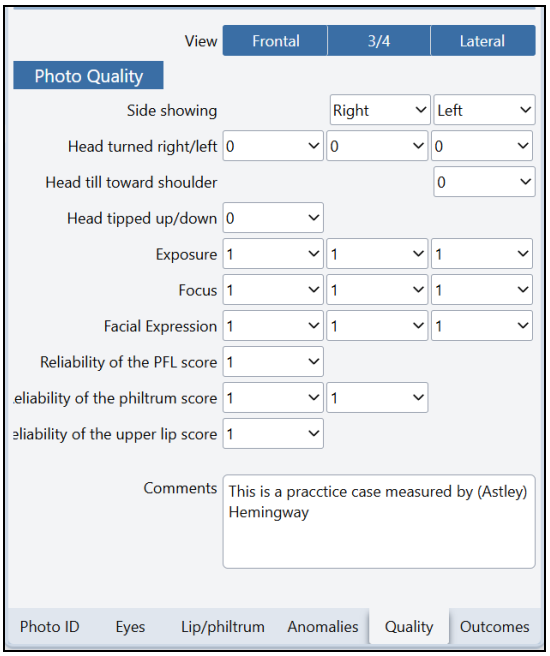


Fig 46. Photo Quality Tab on Worksheet.

Head Turned Right / Left in Lateral Image: Use the drop-down menu to record how much (on a 5-point scale) the patient's face is rotated toward their right (+) or left (-) in the lateral photo. There is no pictorial guide to assist you. Mild rotation implies the amount of rotation present will have only a small impact on the accuracy of the measures obtained from that image. Severe rotation implies the amount of rotation present will have a marked impact on the accuracy of the measures obtained from that image. (Fig 46).

Head Tilt Toward Shoulder in Lateral Image: Use the drop-down menu to record how much (on a 5-point scale) the patient's head is tilted toward their left or right shoulder. There is no pictorial guide to assist you. Mild rotation implies the amount of rotation present will have only a small impact on the quality of the measures obtained from that image. Severe rotation implies the amount of rotation present will have a marked impact on the quality of the measures obtained from that image.

Head Tipped Up / Down in Frontal Image: Use the drop-down menu to record how many degrees the patient's face is tipped up or down in the frontal photo. Use the Up/Down Rotation Pictorial Guide to assist you. You may type in any degree of rotation from –45 through +45 using your best judgement.

Exposure: Use the drop-down menu to record on a 3-point scale if the photo has good exposure, is a bit light/dark or is too light/dark.

Focus: Use the drop-down menu to record, on a 3-point scale, if the photo has good focus, is a bit blurry or is too blurry.

Photo Quality Tab on the Worksheet

(Continued)

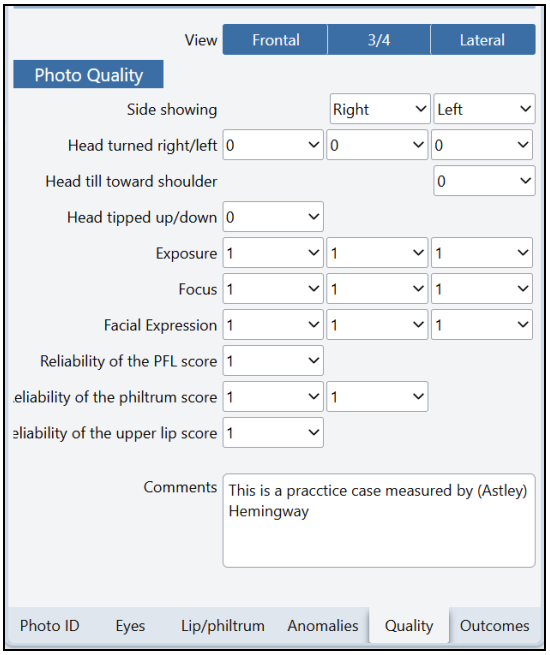


Fig 47. Photo Quality Tab.

Facial Expression: Use the drop-down menu to record, on a 3-point scale, if the facial expression is relaxed, has a mild facial expression or a severe facial expression. Facial expressions (like a big smile or eyes that are not fully open) will impact measurement accuracy. The goal is to have a relaxed facial expression (Fig 47).

Reliable PFL, Philtrum and Upper Lip Scores. Use the drop-down menus to record, on 5-point scales, if the quality of the photographs leads to reliable ABC-scores and 4-Digit Ranks for each of these three diagnostic features.

Comments: Enter any comments you wish to have recorded in the database and Outcome Report.

Note: Documenting the quality of the 3 photos does not alter the measures obtained for the PFL, lip and philtrum. These photo quality measures simply describe the quality of the photos, helping inform the clinician if they can trust the accuracy of the PFL, lip and philtrum measures.

Outcomes Tab on the Worksheet

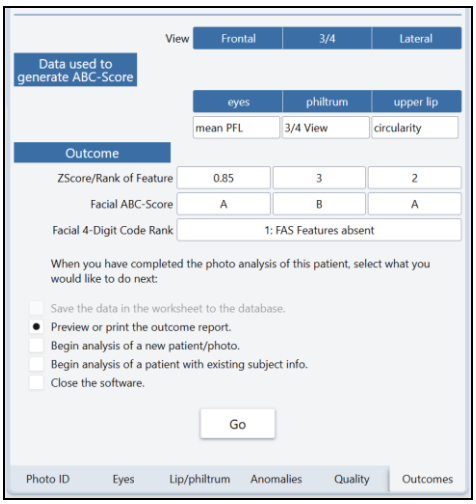


Fig 48. Outcomes Tab on the Worksheet.

To Use: Select the Outcomes tab at the bottom of the Worksheet (Fig 48).

Outcome: This last section automatically uses the facial measures you generated in the Eyes and Lip/philtrum tabs to produce the FAS Facial ABC-score and Face Rank in accordance with the 2024 FASD 4-Digit Code.

Data used to generate Face ABC-Score: You have the option of selecting which data you would like to use to generate the Facial ABC-Score and 4-Digit Rank. For example, click on the mean PFL cell and note that you can select R.PFL, L.PFL or mean PFL from a drop-down menu. Your selection should be based on which source of information provided you with the most accurate data.

Eyes: You have the option to select the mean PFL, right PFL or left PFL to generate the z-score. The mean PFL is recommended because it will adjust for any right-to-left rotation that may exist in the photo. On rare occasion, the quality of the photo or a true asymmetry in the size of the right and left PFL requires that just the right or left PFL be selected rather than the mean. If there is a true asymmetry in the size of the two PFLs, ($\geq$ 2 mm's) AND there is NO right-to-left rotation in the frontal image, choose the largest and/or most normal PFL rather than using the mean of the two PFLs.

Philtrum: You have the option to use the philtrum rank from the frontal or the ¾ view photo. The ¾ view provides a more accurate measure.

Upper lip: You have the option to Rank the upper lip from the using the circularity measure or from the best matched picture on the Lip-Philtrum Guide. Circularity is the more accurate measure.

Z-score/Rank of Feature: The z-score or rank of each feature will automatically fill into the cell based on which source of data you choose to use to generate the ABC-Score.

Facial ABC-Score: This score is automatically computed. A is normal, B is moderately abnormal, C is significantly abnormal. See the Lip-Philtrum Table Guides in the Guides top menu.

Facial 4-Digit Rank: This score is automatically computed. Rank 1= FAS features absent; Rank 2 = FAS features mild; Rank 3 = FAS features moderate; Rank 4 = FAS features severe.

Saving the Data in the Worksheet to the Facial Software Database

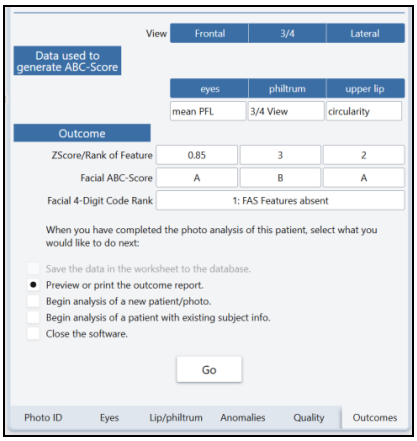


Fig 49. Saving the Data to the database.

To Save: Click on the Outcomes tab at the bottom of the Worksheet. Click the radio button "Save the data in the worksheet to the database" (Fig 49.) Click on the OK button

The software will save the data to the database it is pointing to as displayed in the Tools/Options Database file window. (Fig 56)

Note: The data you generate in the Worksheet does not automatically store in the database. It only stores in the database if you click the "Save the data in the worksheet to the database" radio button. You can save the data in the worksheet periodically as you advance through the measurement tabs. After you save the data for the first time, the software will ask you if you want to "overwrite the saved data" if you go back and change the data or add new data to the Worksheet.

Previewing/printing the Outcome Report.

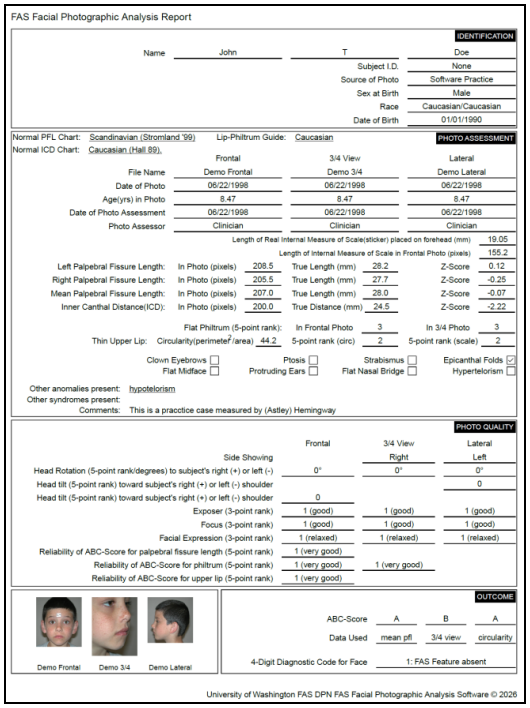


Fig 50. Preview of Outcome Report.

To preview the Outcome Report: Click on the Outcomes tab at the bottom of the Worksheet. Click on the "Preview or print the outcome report" (Fig 50). Confirm all data entered by you is correctly presented in the Outcome Report (e.g., dates, sex, pfl chart, lip-philtrum guide, etc.). This ensures the validity of the calculated measures.

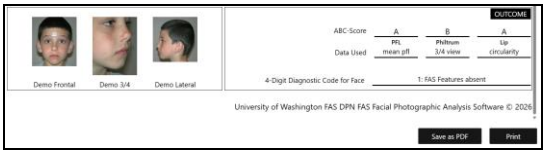


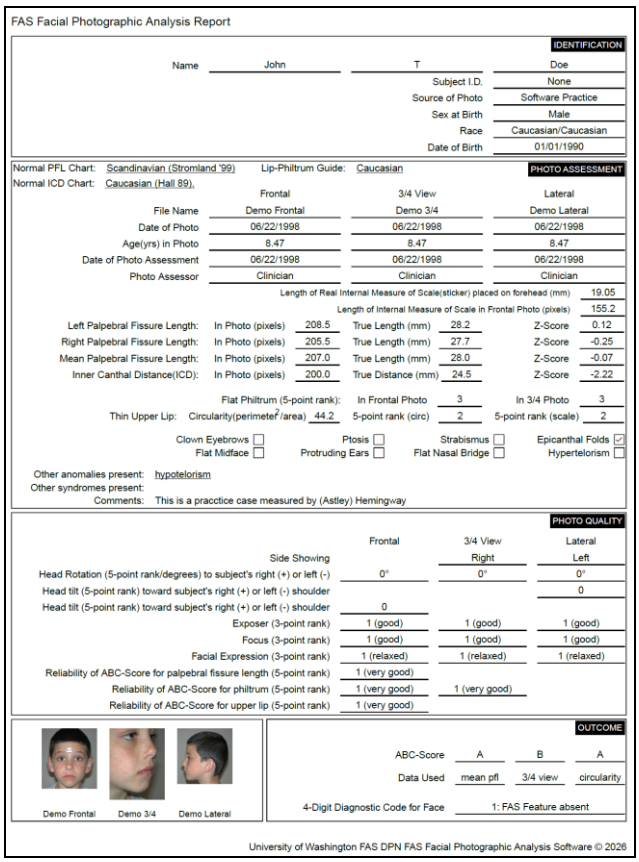
Fig 51. Save as PDF and Print buttons

To print the outcome report or save as a PDF: Click on the "Save as PDF" or "print" black buttons on the bottom of the Outcome Report preview. (Fig 51)

To start the analysis of the next case, Click on "*Begin analysis of a new patient/photo*" in the Outcomes Tab (Fig 49)

John Doe Practice Case

Fig 52. This case, John Doe, serves as a Practice Case. This is an example of a child with normal facial features. The Identification data inserted in the Report is fictitious



FAS Facial Photographic Analysis Report

IDENTIFICATION

Name	John	T	Doe
Subject I.D.			None
Source of Photo			Software Practice
Sex at Birth			Male
Race			Caucasian/Caucasian
Date of Birth			01/01/1990

PHOTO ASSESSMENT

Normal PFL Chart: Scandinavian (Stromland '99) Lip-Philtrum Guide: Caucasian
Normal ICD Chart: Caucasian (Hall 89).

	Frontal	3/4 View	Lateral
File Name	Demo Frontal	Demo 3/4	Demo Lateral
Date of Photo	06/22/1998	06/22/1998	06/22/1998
Age(yrs) in Photo	8.47	8.47	8.47
Date of Photo Assessment	06/22/1998	06/22/1998	06/22/1998
Photo Assessor	Clinician	Clinician	Clinician

Length of Real Internal Measure of Scale(sticker) placed on forehead (mm) 19.05
Length of Internal Measure of Scale in Frontal Photo (pixels) 155.2

Left Palpebral Fissure Length:	In Photo (pixels)	208.5	True Length (mm)	28.2	Z-Score	0.12
Right Palpebral Fissure Length:	In Photo (pixels)	205.5	True Length (mm)	27.7	Z-Score	-0.25
Mean Palpebral Fissure Length:	In Photo (pixels)	207.0	True Length (mm)	28.0	Z-Score	-0.07
Inner Canthal Distance(ICD):	In Photo (pixels)	200.0	True Distance (mm)	24.5	Z-Score	-2.22

Flat Philtrum (5-point rank):			In Frontal Photo	3	In 3/4 Photo	3
Thin Upper Lip:	Circularity(perimeter²/area)	44.2	5-point rank (circ)	2	5-point rank (scale)	2

Clown Eyebrows ☐ Ptosis ☐ Strabismus ☐ Epicanthal Folds ☑
Flat Midface ☐ Protruding Ears ☐ Flat Nasal Bridge ☐ Hypertelorism ☐

Other anomalies present: hypotelorism
Other syndromes present:
Comments: This is a pracctice case measured by (Astley) Hemingway

PHOTO QUALITY

	Frontal	3/4 View	Lateral
Side Showing		Right	Left
Head Rotation (5-point rank/degrees) to subject's right (+) or left (-)	0°	0°	0°
Head tilt (5-point rank) toward subject's right (+) or left (-) shoulder			0
Head tilt (5-point rank) toward subject's right (+) or left (-) shoulder	0		
Exposer (3-point rank)	1 (good)	1 (good)	1 (good)
Focus (3-point rank)	1 (good)	1 (good)	1 (good)
Facial Expression (3-point rank)	1 (relaxed)	1 (relaxed)	1 (relaxed)
Reliability of ABC-Score for palpebral fissure length (5-point rank)	1 (very good)		
Reliability of ABC-Score for philtrum (5-point rank)	1 (very good)	1 (very good)	
Reliability of ABC-Score for upper lip (5-point rank)	1 (very good)		

Demo Frontal Demo 3/4 Demo Lateral

OUTCOME

ABC-Score	A	B	A
Data Used	mean pfl	3/4 view	circularity

4-Digit Diagnostic Code for Face 1: FAS Feature absent

University of Washington FAS DPN FAS Facial Photographic Analysis Software © 2026

Fig 53. Practice Case Report for John Doe. The John Doe photos were measured by Dr. (Astley) Hemingway and serve as a practice case for Users.

To Use: Select File/Open/Existing Subject File from the top menu bar. Click the folder icon under the Action column for John Doe. The frontal, ¾ and lateral facial photos and a completed Worksheet will appear for your review and practice. To view the Report, select Reports from the top menu bar. Check the box for the subject named John Doe. Press the Preview button. To print the Report, click on the Print icon on the Tool Bar.

The purpose of this practice case is to allow the User to practice using the measurement tools to see if they can duplicate the outcomes of key measures like:

Left PFL = 28.2 mm
Right PFL = 27.7 mm
Inner Canthal Distance = 24.5 mm
Internal Measure of Scale = 155.2 pixels
Lip circularity = 44.2
Philtrum smoothness = Rank 3

It is recommended you first print the report to use as a Guide, because once you start altering data in the Worksheet, your alterations will be reflected in the Report (Fig 53).

Even though you can alter the data in the Worksheet and Report, you will not be able to save the altered data. This will protect the Practice Case for future use and reference.

To refresh the Practice Case to its original data, go to the Outcome Tab on the Worksheet, select *Begin analysis of a patient with existing subject info* and click on GO. Click on the Action folder for John Doe. A refreshed version of the Practice Case will appear on your screen.

To close the John Doe case, click on the red circled X on the top corner of the Worksheet.

Circularity Practice Guide

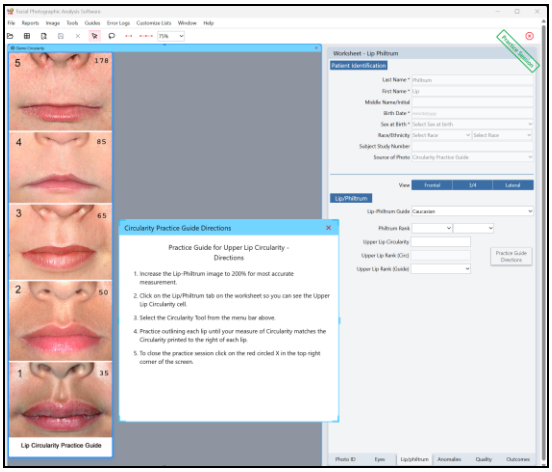


Fig 54. Circularity Practice Guide presented with the Directions for how to use.

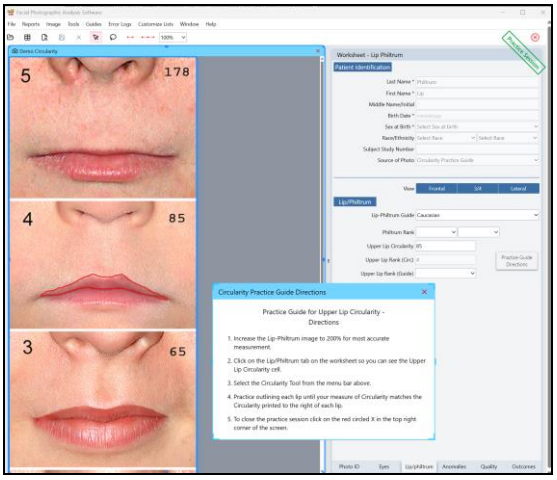


Fig 55. Image zoomed in to enlarge for measuring circularity.

To Use: This Circularity Practice Guide allows you to practice outlining the upper lip with the goal of matching the circularity measures posted on the Guide. Select File/Open/Existing Subject File from the top menu bar. Select the folder icon under the Action column for Lip Philtrum. The Lip-Philtrum Guide 1 will appear for you to practice outlining the lip.

For Directions:

1. Click on the "Practice Guide Directions" button showing in the Lip/Philtrum window of the Worksheet. (Fig. 54)
2. Increase (zoom) the size of the Lip-Philtrum Guide for most accurate measurement.
3. Select the Circularity Tool from the top menu bar.
4. Practice outlining the red portion of each upper lip until your measure of circularity repeatedly match or nearly match the circularity printed to the right of each lip photo. Note that your outline should reach from the left to the right corners of the mouth (Fig 55).
5. Each time you select the Circularity tool to outline a lip; a window will appear alerting you that "There is already an upper lip circularity value. Do you want to overwrite?" Click Yes.
6. To end the session, click on the red circled X on the top right of the window.

Tips:
Note that more accurate, reproducible measures can be achieved when the image is increased in size using the zoom feature. The circularity of the lip does not change with magnification, but your ability to outline it accurately will.

Test your ability to outline the same lip and get the same or very nearly the same circularity each time. See our website (fasdpn.org) for an animated example of lips being outlined.

Consider outlining a subject's lip 2 or 3 times and taking the average across the multiple measures to obtain the most accurate measure of circularity.

PART VI. SAVING / DELETING / EXPORTING THE DATA

The Facial Software Database

When you analyze a set of photographs for a patient, the data is displayed in the Worksheet. When you save the data in the Worksheet, it is saved as a single Record in the database, linked to the patient's last name, first name, birth date, and sex at birth. If you analyze a second set of photographs for a patient, perhaps photos taken at a different age, this second Worksheet will be saved as a second record for that patient.

An Important Note:

The User can rename the database where the facial data is stored and can locate that database anywhere on their hard drive. When the software is first installed, it creates a default database named fas.db and places it in the C:/FAS/Database/fas.db directory (Fig 56). In the Tools/Option drop down menu, the software documents the name and location of the database the software is pointing to. If the User closes the software, navigates to the fas.db database on their hard drive and moves it to a different location, the software will not work because its link to the database will be broken. To prevent this problem, never move a database when the software is closed. Instead, make a copy of the database and move the copy to the new location. Then open the software, go to the Tools/Options window and browse (by clicking on the 3dot icon (…) in the Database File window) to redirect the software to the new location of the database.

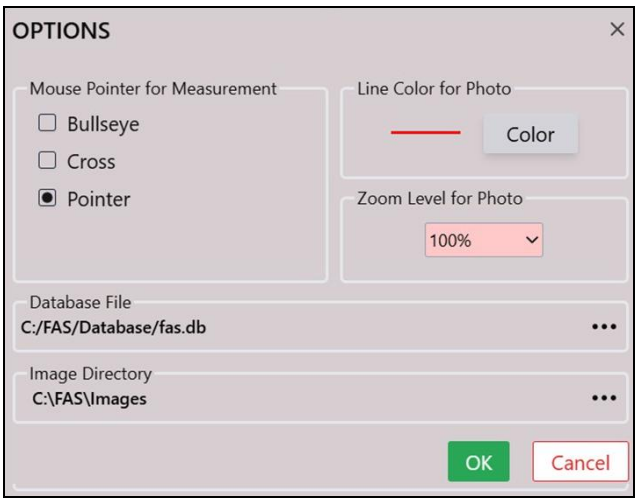


Fig 56. Renaming and relocating the software database.

Saving the Data in the Worksheet to the Facial Software Database

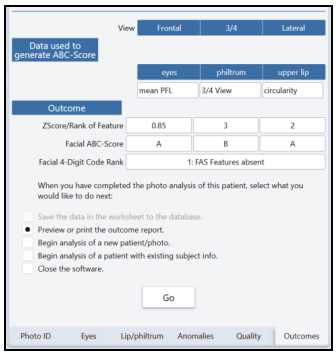


Fig 57. Saving the data to the database.

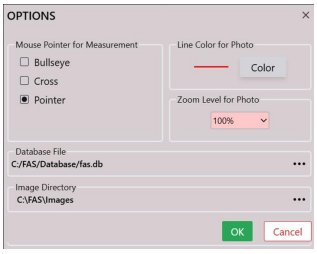


Fig 58. The data will be saved to the last database the User pointed to in the Database File window in the Tools/Options window.

To Save: Click on the Outcomes tab at the bottom of the Worksheet. Click the radio button "Save the data in the worksheet to the database" (Fig 57).

The data will be saved in the database you last pointed to in the Tools/Options window from the top menu bar. In Fig 58 the Options window shows the data will be saved in the fas.db database located along this path C:/FAS/Database/fas.db.

Deleting Data in the Facial Software Database

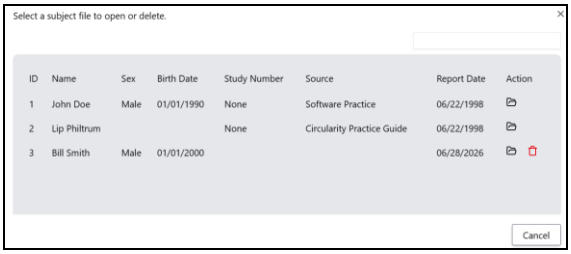


Fig 59. Deleting a patient record from the database

To delete a patient record from the Database:

1. Click File/Open/Existing Subject File from the top menu.

2. Click on the red trash can icon for the patient case you want to delete. (Fig 59)

Exporting Data from the Database to a .csv file

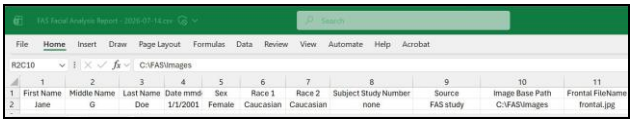


Fig 60. All data for each patient is exported to a .csv file into the Users download folder.

To export all patient records to a comma-separated values .csv file:

Click on File/Export Records from the top menu bar.

A green sign will appear informing the User the records were exported to a comma separated values .csv file in their computer's download folder. The .csv will receive the following name followed by the date the database was exported: "*FAS Facial Analysis Report-2026-07-14.csv*" (Fig 60). We recommend you rename the .csv file to reflect the name of the facial database used to create the .csv file. We recommend you export your data periodically to safeguard it.

PART VII. DATABASE MANAGEMENT

Database Management

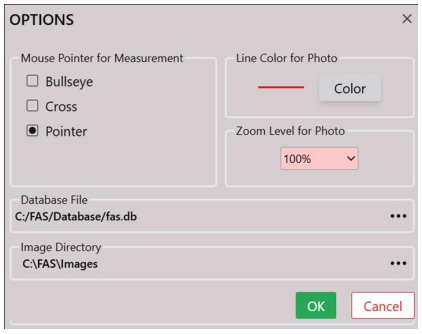


Fig 61. The Options window is opened from the Tools tab on the top menu bar.

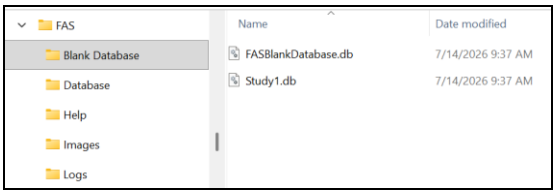


Fig 63. BlankFASDatabase.db copied and renamed to Study1.db

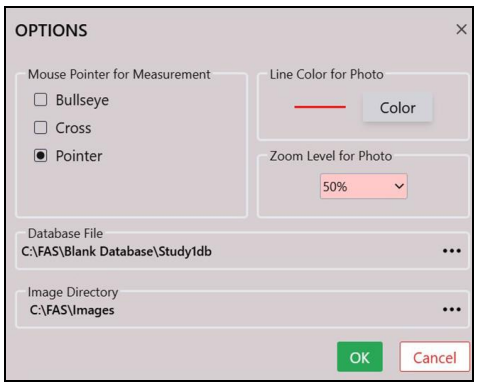


Fig 64. Software is now pointing toward the Study1.db as the place to save your photo analysis data.

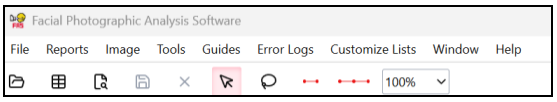


Fig 65. Error logs

The following database management tools are provided.

Selecting which database to save your data to
The Options window (Fig 61) is opened by clicking on Tools in the top menu bar. The Database File window shows you which database the software is saving data to. By default it will point to the fas.db database located at C:/FAS/Database/fas.db. You can create multiple databases, name them as you wish and locate them anywhere on your hard drive. To save data to another database you would click on the 3dot browse icon in the Database File window, navigate to your other database and click OK. The new database will appear in the Database File window.

To create another database
Close the software. Navigate to C:\FAS\Blank Database on your computer.

Make a copy of the **FASBlankDatabase.db** and rename it (e.g., **Study1.db**) (Fig 63). You can place the **Study1.db** database anywhere on your hard drive. Open the software, click on Tools/Options. Note the software is pointing to C:\FAS\Database\fas.db (Fig 61). Click on the 3dots browse icon for the Database File (Fig 64). Navigate to C:\FAS\Database\Study1.db and click OK. Your data will now be stored in Study1.db until you select a different database.

Managing your Photos
See "Fundamentals of V.3" on page 4 regarding photo management.

Error Logs
To Use: Select Error Logs from the top menu bar.

The Error Log documents all activity regarding Errors and can be useful for trouble shooting (Fig 65).

DICTIONARY

Anomaly
: A physical feature that is present in less than 3% of an age and race appropriate sample of the population

Circularity
: A quantitative measure (perimeter^2/area) used to objectively measure upper lip thinness. The thinner the upper lip, the greater the circularity. See the Lip Circularity Tables on page 15 of this Manual.

Clown eyebrows
: Eyebrows that arch upward at the lateral margins. The eyebrow typically follows the superior border of the bony orbital rim.

Endocanthion
: This facial landmark demarcates the inner corner of the eye fissure where the upper and lower eyelids meet. See the Landmark / Rotation Pictorial Guide (Figs 13, 14).

Epicanthal fold: Lateral extension of skin of the nasal bridge over the endocanthion landmark. May be unilateral or bilateral. May be indigenous to some races. More common in very young children across all races. See the Landmark / Rotation Pictorial Guide (Fig 13).

Exocanthion
: This facial landmark demarcates the outer corner of the eye fissure where the eyelids meet. See the Landmark / Rotation Pictorial Guide (Figs 13, 14).

External auditory canal
: The external opening of the ear canal. This is one of two landmarks that demarcate the Frankfort Horizontal plane when viewing the lateral facial photograph. See the Landmark/Rotation Pictorial Guide (Fig 13).

Flat (hypoplastic) midface
: Under-development of the maxilla relative to the nasal process.

Flat nasal bridge
: The bridge of the nose between the eyes is depressed (flattened). May be indigenous to some races and is more common in very young children across all races.

Frankfort horizontal plane
: A plane demarcated by a line drawn from the external auditory canal to the lowest border of the bony orbital rim (orbitale). This plane is used in anthropometry to standardize the positioning of the head. To measure the FAS facial features, the camera lens should be placed in the patient's frankfort horizontal plane. See the Landmarks/Rotation Pictorial Guide (Fig 13).

Hypertelorism

Ocular hypertelorism is an abnormal increased distance between the centers of the pupils. This term is also often used to denote an abnormal increased distance between the right and left endocanthion landmarks (Fig 13).

Hypotelorism

Ocular hypotelorism is an abnormal decreased distance between the centers of the pupils. This term is also often used to denote an abnormal decreased distance between the right and left endocanthion landmarks (Fig 13).

Inner Canthal Distance

The distance between the eyes from the right endocanthion to the left endocanthion. See the Landmark/Rotation Pictorial Guide (Fig 13).

Internal Measure of Scale

The paper sticker (typically ½ to ¾ inch) placed on the patient's forehead to serve as a ruler or internal measure of scale in the photograph. This allows the true PFL and inner canthal distances to be computed. See the Landmark/Rotation Pictorial Guide (Fig 13).

Orbitale

The lowest point on the bony orbital rim. This is one of two landmarks that demarcate the Frankfort Horizontal plane. See the Landmark/Rotation Pictorial Guide (Fig 13.

Overlay

A term used in this software program that refers to the lines that are temporarily drawn on the photograph when distance or circularity measures are being taken. These overlays can be removed from the photograph by clicking on Image/Clear Overlays in the top Menu bar.

Palpebral fissure length (PFL)

A measure of the width of the eye. The distance between the exocanthion to the endocanthion landmarks. See the Landmark/Rotation Pictorial Guide (Fig 13).

Phenotype

Physical appearance.

Philtrum

The vertical groove between the nose and upper lip. See the Landmarks/Rotation Pictorial Guide (Fig 13).

Pixels

A unit of measure used in computerized image analysis. A pixel is one dot of light on the computer monitor.

Ptosis

Drooping of upper eyelid covering part of the pupil. Generally caused by a weakness in the levator palpebrae superious muscle. See the FAS Face / Other Anomaly Pictorial Guide (Fig. 13).

Thin upper lip

When measuring the thinness of the upper lip, the part of the upper lip that is being referred to is the red or vermilion portion of the upper lip. See the Landmarks/Rotation Pictorial Guide (Fig. 13).

Tragus

A small extension of tissue in front of the external auditory canal. This is one of two landmarks that demarcate the Frankfort Horizontal plane when viewing the frontal facial photograph. See the Landmark/Rotation Pictorial Guide (Fig. 13).

Z-score

The z-score reflects how many standard deviations above or below the population mean the patient's PFL is, based on the patient's age and sex. The z-score is defined as the patient's PFL minus the mean PFL for the normal population divided by the standard deviation of the mean PFL for the normal population.

More detailed descriptions of human malformations can be found on the National Human genome Research Institute website entitled "Elements of Morphology" Human Malformation Terminology". https://elementsofmorphology.nih.gov/

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