

Variations2: IU Digital Music Library Version 2.0 Usability Test Report October 20, 2003

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Executive Summary

During July 2003, a round of usability testing was conducted on version 2.0 of the [Variations2: IU Digital Music Library software](#). Variations2 aims to establish a digital music library testbed system for the purpose of examining dissemination of digitized music in a variety of formats. The [current Variations system](#) is used primarily by music students to listen to CD-quality recordings online at computer workstations in the IU-Bloomington Cook Music Library.

During five sessions, seven music students used V2 to work through a series of tasks. In two sessions, participants worked in pairs; three participants completed sessions individually. Major goals of the formative evaluation were to investigate users' approaches to the following: searching for and playing works; accessing, viewing, bookmarking and printing scores; and diagramming work structures with the timeline tool.

Via comments and a satisfaction questionnaire, users indicated above-average satisfaction with the system as a whole. They suggested that the search process was more "streamlined" than IUCAT and the audio player better than the current Variations player. Score viewer default layout was mostly satisfactory, although a few users adjusted to a 2-page view and some requested expanded functionality for score manipulation. It was evident that the process of printing score pages was vastly improved over the process used in version 1.0 and users were impressed by the quality of score printouts. The concept of completing form diagramming tasks on the computer vs. on paper was met with enthusiasm, although an initial learning curve was apparent. Paired users tended to utilize V2 in a much more exploratory and informal fashion and were more talkative [to each other] during sessions. Conversely, individual users tended to be more task-focused and likely to ask the facilitator for help.

Problems were encountered in several areas, although no user experienced any "show-stopper" difficulties. For instance, the act of bookmarking score pages was sometimes difficult due to the large size of the songbook used in the task. In these cases, bookmarks placed close together were difficult to precisely click on for score navigation purposes. Issues associated with the timeline included figuring out the correct window from which to start a new timeline, the misconception that the timeline would be associated with the score viewer, and various problems with deleting and grouping bubbles, and adding labels/annotations. Additionally, one user was color blind, a characteristic which introduced an interesting accessibility variable due to the timeline tool's heavy reliance on color coding of musical sections.

Recommendations for redesign based on all user sessions are provided. Areas discussed include search window functionality, score viewer bookmarks, and timeline tool activities such as creating new timelines and grouping/coloring bubbles.

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I. Purpose of the Study

The [Variations2: IU Digital Music Library project](#) (V2) aims to establish a digital music library testbed system that contains music in a variety of formats. The current Variations system is used primarily by music students to listen to CD-quality recordings online at computer workstations in the IU Cook Music Library.

This formative usability test examined Variations2, version 2.0, in preparation for its release in September 2003. Goals of this test included:

- Determine what problems users have when searching for selections;
- Determine what problems users have when accessing listening selections with the audio player;
- Observe which methods of score viewing users prefer;
- Determine what problems users have when accessing, bookmarking and printing scores;
- Judge whether score printing process was improved over v1.0;
- Determine what problems users have when accessing and manipulating the timeline tool;
- Gauge user satisfaction with the timeline tool, in particular, use of computer-based tools (vs. paper) to complete form diagramming tasks;
- Monitor problem areas to determine which need to be added to the help pages;
- Gauge users' levels of frustration and/or satisfaction with V2 as a whole.
- Observe differences in interaction and usage patterns when users work with a partner versus when users work individually.

Variations2 Components

Version 2.0 of Variations2 includes various components, most of which were present in testing of version 1.0. However, some changes were made to these components from v1.0 to v2.0. In addition, the timeline tool was not tested in the v1.0 round of testing. Therefore, components used in this round of testing are illustrated below. They include the search interface, audio player, score viewer, bookmarks editing window, and timeline tool.

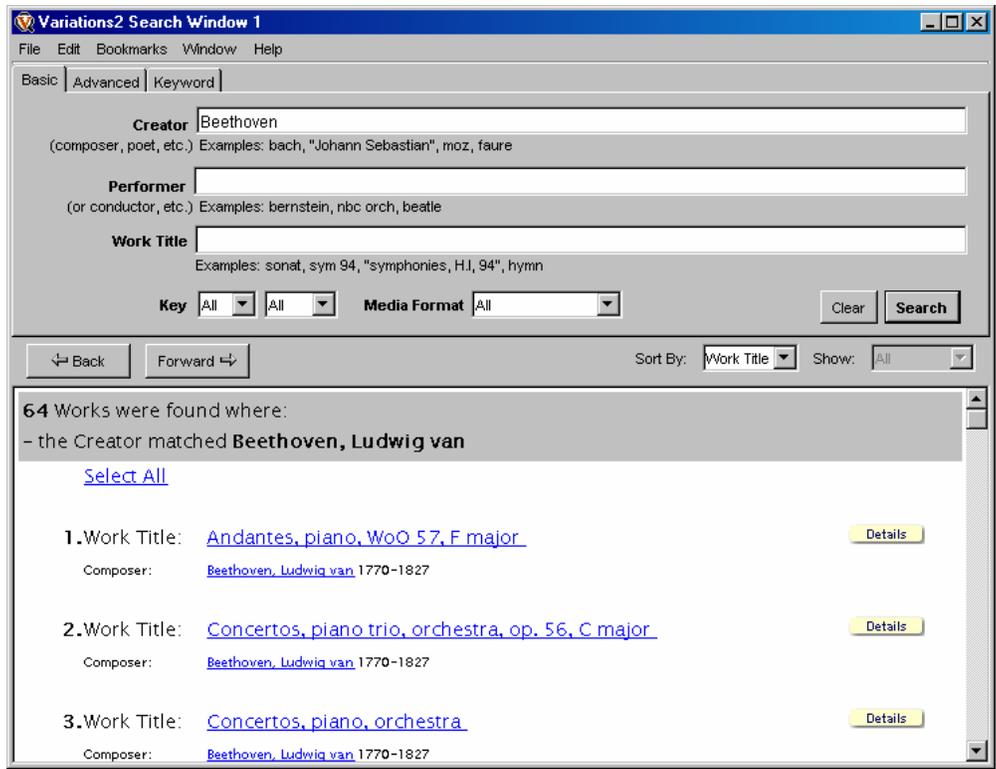


Figure 1 - Search Window

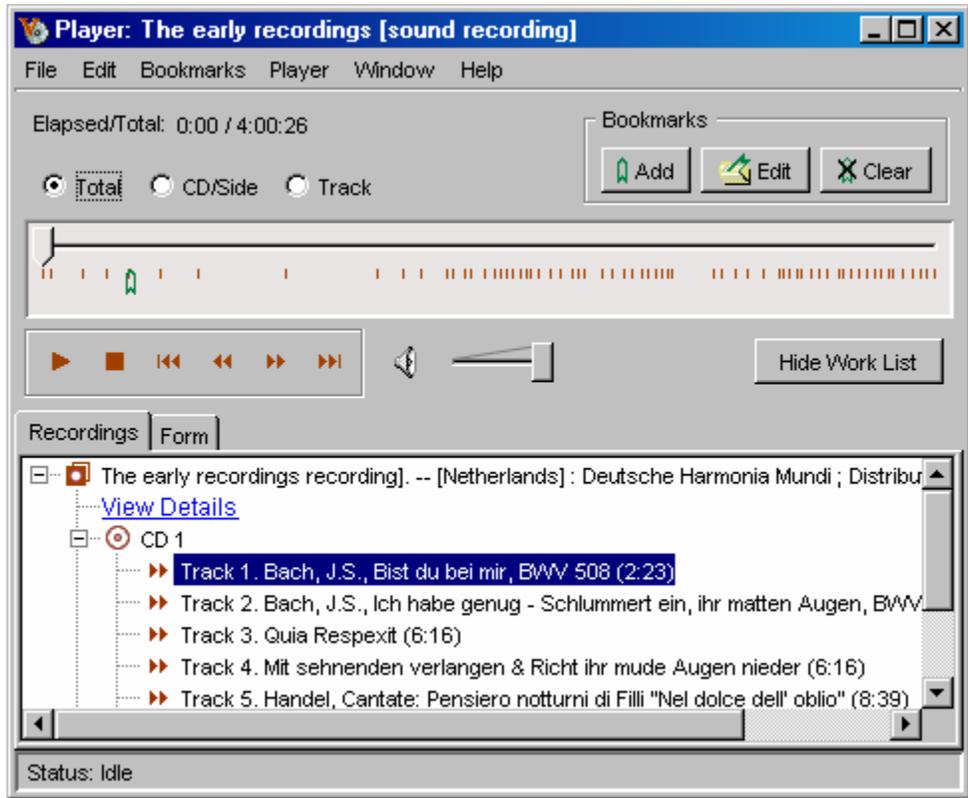


Figure 2 - Audio Player

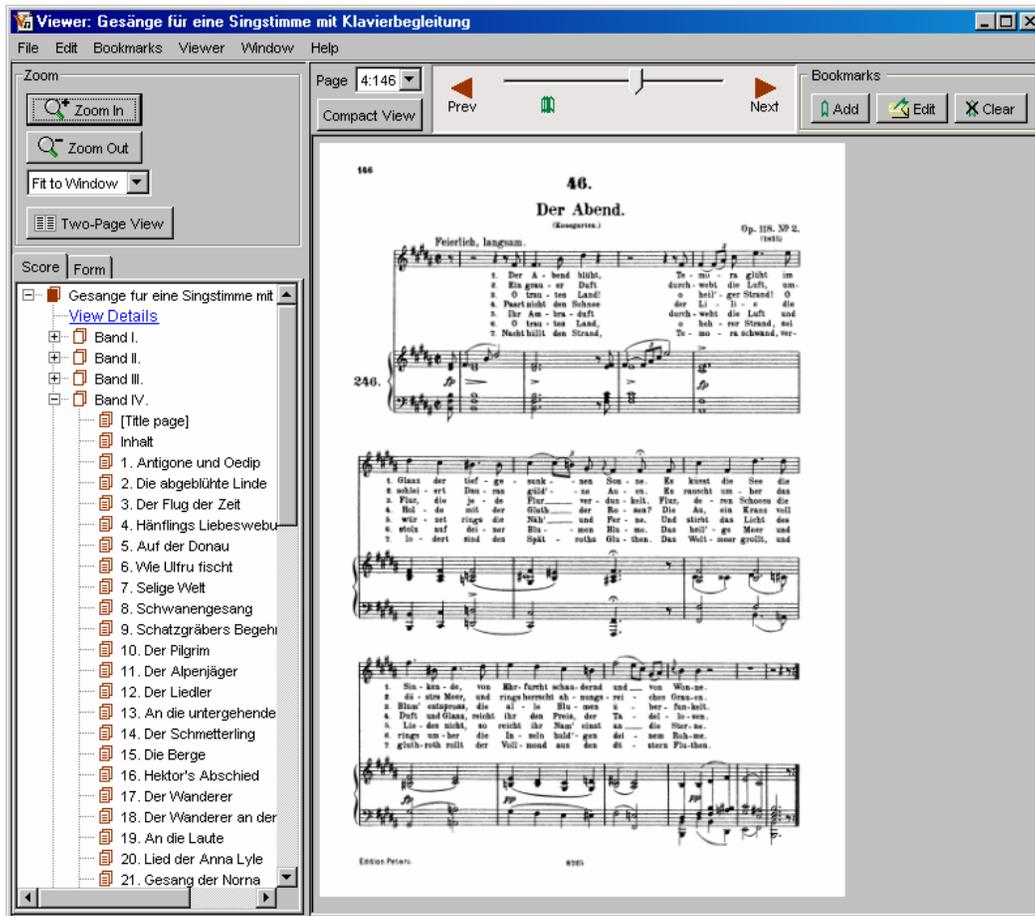


Figure 3 – Score Viewer

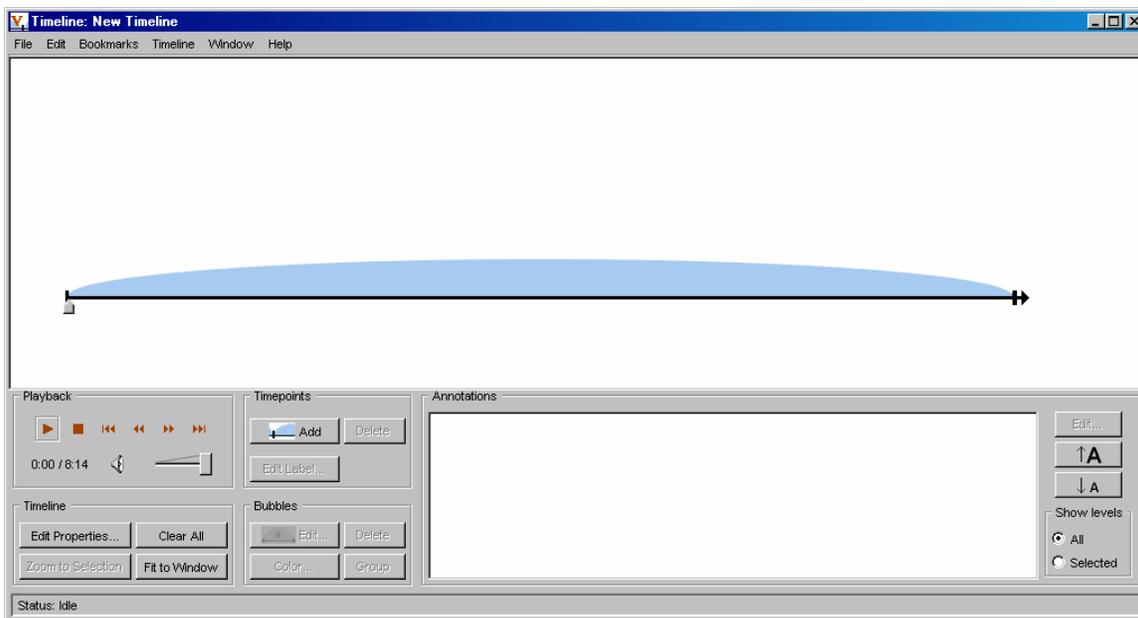


Figure 4 – Timeline Tool

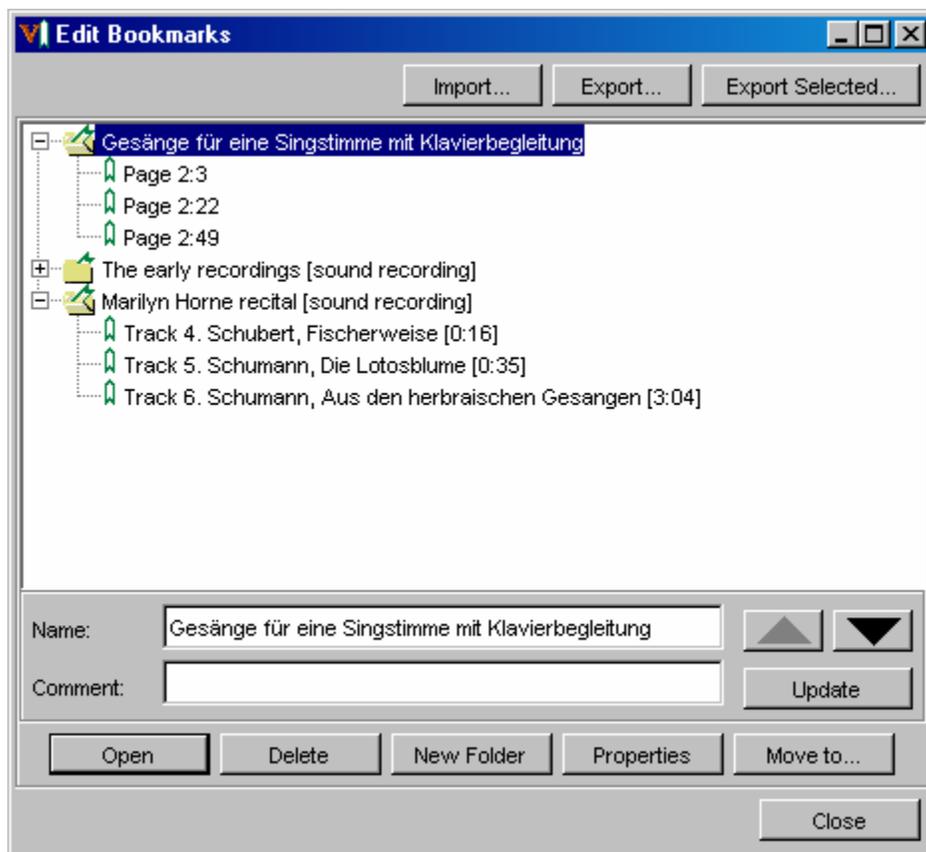


Figure 5 – Edit Bookmarks Window

II. Participants

Seven music students were recruited by the facilitator from two summer II 2003 classes (T351 and T508) at the IU School of Music. During recruitment, the facilitator explained the purpose of the study and passed around a sign-up sheet which was identical for both classes. Those students who were interested in participating wrote their names and emails addresses on the sheet. The facilitator then contacted them at a later time to set up session times. A total of five sessions were completed. Participants worked in pairs during the first two sessions; users worked individually during the last three sessions.

As illustrated in Table 1 below, participants had varying majors, ages, general computer experience, prior Variations experience and reasons for using Variations. All were music majors; majors represented included violin, voice and audio recording. Their ages ranged from 20 – 30 years, with a mean age of 24.7 years. Four participants listed their native language as English, two as Spanish, and one was a native German speaker.

Three participants claimed to use computers at least 11 hours a week with two claiming over 21 hours per week. Of the other four, three indicated they used computers 6-10 hours per week and one only 0-5 hours per week. Platform experience ratings reflected moderate experience with both PC's and Mac's. On a

scale from 1-5, with 1 being Novice and 5 being Expert, the mean result for PC use was 3.86 and for Mac use was 3.14.

Table 1: Participant Characteristics

#	Gender	Age	Major	Computer Use (hrs/wk)	Computer Experience (1=novice - 5=expert)	
					PC	Macintosh
1	F	27	Violin	6-10	4	2
2	M	26	Violin	6-10	2	4
3	M	20	Audio Recording	21+	5	4
4	M	21	Telecom (music minor)	21+	5	5
5	F	23	Violin	11-20	4	3
6	M	30	Voice	6-10	5	3
7	M	26	Violin	0-5	2	1

Participants reported moderate to high levels of Variations use and experience. Two users indicated usage at once every two weeks; of the remaining five users, all claimed to use Variations at least 1-5 times a week, with three reporting use of Variations more than five times a week. Five reported that they began using Variations within the last two years, while the other two had been using Variations for more than two years.

Respondents' typical Variations activities were also gauged. As expected, listed uses were similar to those indicated in usability tests of version 1.0. Uses of version 2.0 were inclusive of the following activities:

- class preparation, including course reserve list listening
- repertoire preparation
- personal listening

III. Method

All test sessions were coordinated by the facilitator and completed at the School of Library & Information Science (SLIS) Usability Lab. Upon each participant's arrival at the lab, the facilitator explained briefly the purpose of the usability test and also made sure that participants were comfortable with the set-up of the lab. Participants were then seated at a PC (set to 1024x768 resolution) and given a packet of information and briefed on the session procedure. Paired participants were both seated in front of the PC and then allowed to choose their seating arrangement and equipment placement (e.g. who would control the keyboard/mouse). First, each participant filled out a demographic questionnaire (see Appendix, p. 21). Once done with that, the facilitator entered the test room, explained the task list (see Appendix, p. 22), and gave a brief orientation to the system and its components. The participant(s) then logged into the Variations2 system and attempted to complete the given tasks while thinking aloud. Prior to each session, a laser printer was moved into the testing room so that participants could immediately see results of their printing tasks. Audio as well as computer screen interactions were videotaped for future analysis. After the scenarios and tasks were completed to the best of the

participant's ability, each participant filled out a V2 satisfaction survey (see Appendix, p. 23). After the participant completed the survey, the facilitator then asked a few debriefing questions based upon observations of the participant's task completion activities and comments. Finally, the facilitator thanked the participant(s) for his or her participation, answered any questions about the testing procedure that the participant might have had. Finally, each participant filled out a receipt for the \$15 Borders gift card each received for completing the session.

IV. Findings

Findings below are organized by the Variations2 components addressed by session tasks. Discussion of the paired vs. individual user interactions follows¹. Lastly, satisfaction ratings are presented. In cases where specific qualitative comments are presented, each comment is designated by a number which references the associated user. For example, a comment made by participant number 4 would be represented by "[4]".

General

Via comments and a satisfaction questionnaire, users indicated above-average satisfaction with the system as a whole. They were enthusiastic about using it in place of IUCAT, and also enjoyed the score viewer and timeline tool. A few bugs showed up, but nothing major occurred that caused undue frustration. It was evident that the printing process was much improved over that in version 1.0. Bookmarking was deemed quite useful, although there were a few difficulties bookmarking and subsequently getting to precise spots in a large, multi-volume songbook. Finally, users found the timeline tool to be fun and useful, often after experiencing a brief learning curve. Although one user who was color blind had difficulty with the default colors in the timeline tool, all other users immediately liked the idea of color coding.

Searching

In general, users expressed satisfaction with and were able to quickly overcome any initial difficulties with the search process. There was some consensus that the Variation2 searching process was much more streamlined than that in IUCAT. Most of the time, users were able to quickly search for and find relevant results, particularly when their searches were fairly broad initially. As they explored, some users wished for more content to be available in the system, but overall the accessible content was satisfactory for the purposes of testing. Although a few participants exhibited a brief learning curve when trying to access online scores vs. recordings, eventually the existence of both recordings and online scores was apparent, due in large part to the presence and visibility of their associated icons: "That's easy enough" [6].

The biggest problem users had with the searching functionality concerned the screen which appeared if no results were returned for a particular query. Specifically, if the search returned no results due to a media format or key signature selection, there was no indicator that either of these selections might be the problem. The user was offered no suggestion by the system to alter their media format or key signature selection. In one case, a pair of users tried three times to adjust their query, unsuccessfully, not realizing that the problem lay in the dropdown key signature selection. Unfortunately, its state remained as it had been selected during the first

¹ Paired users were #s [1,2] and [3,4]

query each time the pair returned to the Basic search tab to try again. Another problem with the search results screen information was that there was no way for users to get to closest matches in the case of an unsuccessful query. Instead, an unsuccessful query required that the user go back to the initial search screen and try a modified or completely new query. A user expressed that "It would be nice here if there were also then the nearest matches which would come up, or if I could click on a link which would give me something else" [6].

Another issue occurred after the user pressed the "Search" button. In cases where a query was prone to return a large number of matches (e.g. Creator = "Schubert") the search time was lengthy. Although this may have been a system performance problem at the time, the larger problem lay in the fact that there was no indication that the system was actually searching, causing the user to erroneously assume that nothing was happening.

A few other minor problems occurred with the searching process. One user indicated that the Work Title was probably more important than the Performer, and thus, that the order of fields in the search window was perhaps out of order: "I'm wondering why Performer is second, rather than Work Title before it. I would think that Work Title would be more looked for" [6]. Other users had problems with this, although they did not make its effect on their searching as explicit. In these cases, the order of the search fields prompted users to enter a term in the Performer field on their way to the Work Title field, whether or not it was necessary. In most cases, this behavior resulted in no results returned due to the narrow nature of the search query. One other minor issue concerned comments that the software does not have a professionally-designed visual appearance. Finally, a minor bug in the code caused a search for "Lennon & McCartney" to return a network error message due to the presence of the "&" character in the query.

Audio Player

Users did not make much use of the audio player in this round of testing due to the nature of the tasks. The few instances in which the audio was used were during completion of Part A tasks which asked users to find and open a score. Sometimes, the audio player was opened accidentally if the user clicked on an item with a recording icon rather than a score icon, or if users were simply exploring the components of Variations2 (This behavior was more likely to occur in the paired sessions).

Only one notable point of confusion was associated with the player. Some users did not understand the purpose of the Form tab, especially in conjunction with the Recording tab: "I'm curious what this whole form is...I think it's just another way to show it" [3,4]. Likely, this was due to the fact that the Recording and Form tab for the selected work both displayed similar information in terms of work structure, perhaps because there were not discernible sections in that particular work.

Finally, when asked about the audio player for V2 compared to Variations, most users claimed it was better than the existing Variations player interface, although one pair of users [3,4] expressed that they would like to have the option to repeat tracks, a feature which is available in the existing Variations player but not in the V2 player. The same pair also liked "how the track view is available – you don't have to use a drop-down".

Score Viewer

As with the audio player, users appeared to manipulate the score viewer with ease. Most left the default 1-page display view as it was, although a few preferred to adjust the view to a 2-page layout. One user selected the "View Details" link and was impressed with the information offered: "Oh great, plate numbers and everything in there. That's really great. Very helpful" [6]. A pair of users expressed a desire to have more mouse controls for score functions, such as right-click options for printing, bookmarking, page turning, zooming, etc: "It'd be nice if there was a right-click option – say if you're in compact view...you need some right-click or keyboard shortcuts for zooming" [3,4]. Another user accidentally erased all her bookmarks despite the display of a dialog box that contained a warning message when she pressed the "Clear" button. In this case, deletion of the bookmarks was not a major problem since she only had a few marked, and completion of the task was not reliant upon placement of specific bookmarks.

Another issue with score bookmarks was discerned due to the task which asked users to bookmark score pages in a Schubert song book. The song book itself was quite large (... pages) and so bookmarks placed on two adjacent songs, for example, were difficult to see on the slider. In turn, it was also difficult to click on these bookmarks precisely for the purpose of opening the score to that bookmarked spot: "It's kinda hard to see that we have those bookmarks in there."

A second issue arose when it appeared that items in the Score tab were open/expanded that should not have been since the user(s) had not actually clicked on those links to open them. Eventually it was figured out that this was caused by functionality built in to the Score Viewer which opens/closes the Score tab tree based on page navigation via the slider or the "Prev" and "Next" buttons. Users were initially confused and thought that they were seeing evidence of a previous user's Score page selections.

A bug in the software caused a pair of users [3,4] to be unable to open one exported bookmark link. The problem was that the page bookmarked was page "0". When the user tried to click on that bookmark nothing happened in the score viewer and the numbering in the score was off somehow. Presumably this was caused by a cataloging issue with the score itself.

Printing

On the whole, printing in this version was vastly improved over the printing process in version 1.0. Users were quickly able to print a score selection by simply selecting the "Print..." option in the File menu and choosing page number options from the resulting dialog box (see Figure 6).

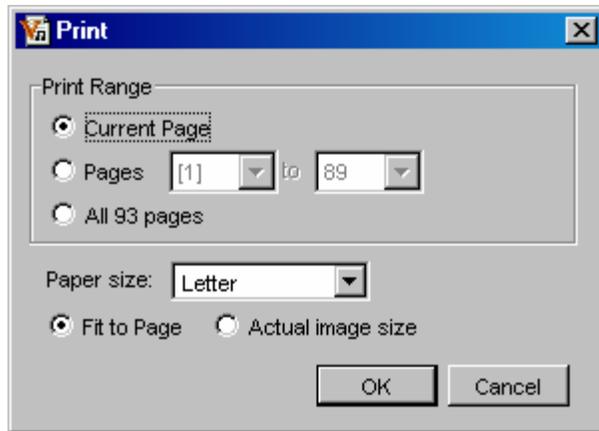


Figure 6 – Print Dialog Box

Only a few minor complaints arose from printing. One user, for instance, did not like the layout of the printed score page: “You know what, I don’t like the way it sits on the page – something about the margin” [2]. The same user also noted that smaller notes were blurry on a print out of a symphony score. As well, a pair of users [3,4] requested that there be a print icon somewhere in the score viewer so that the “Print...” function could be accessed in a way other than from the File menu. Finally, there was a comment made that there “should not be a radio button for printing all pages” [3] because someone might accidentally try to print an entire score.

Bookmarking

The major issue with the bookmarking process was the lack of a way to access the bookmark help page from anywhere within the Variations2 system. Most bookmark functions are only available within the Edit Bookmarks window, which does not have any menus. Thus, there is no way for a user to be able to go to a help page from a Help menu (as with the search, audio player, score viewer and timeline tool windows).

Another difficulty, although not examined via the tasks, was that the only way to export bookmarks to a Webpage was via the “Export...” button, which is only accessible within the Edit Bookmarks window. Therefore, it is somewhat invisible to users who might otherwise understand the purpose of exporting and be apt to use that function.

Other minor difficulties with bookmarking included the fact that bookmarks are ordered in the order in which they are placed by the user, such that a list of bookmarks in a songbook score, for example, may be numerically out of order in the bookmark dropdown list unless the user reorders them. As well, in the case of the Schubert songbook, the first part of each bookmark name was the title of the songbook, rather than the actual song selected. The user has to rename each bookmark in order to differentiate between songs in the bookmark dropdown menu. Finally, user #5 attempted to print bookmarked pages from the Edit Bookmark window, a function which is unavailable in that location.

Timeline Tool

The timeline tool was the most prominent component of this round of testing. Usability issues with the timeline are divided into several sections, including opening/starting, playback, timepoints, grouping/deleting, labels/annotations, color,

exporting and other issues. Overall, users expressed enthusiasm about using the timeline tool to complete theory assignments. Further, they felt that although it would require fundamentally different skills from using paper to diagram, it would be unquestionably useful.

Opening/Starting Timelines

Initially, users were a bit confused about how to start a new timeline in terms of which window was the correct starting point. Some assumed that a new timeline would start from a score, presumably because that is how form diagramming is typically done: "Let's see. I guess you'd make a timeline off the score, I assume...OK, I guess I need to make the timeline out of the recording. Since this is new for me, I wouldn't have known that" [6]. Others tried to open a timeline from the search window File menu but soon discovered that the option was grayed out. Once it was discovered that a new timeline had to be opened from the audio player, users were then presented with a New Timeline dialog box which required them to select the desired track to be diagrammed. Problems arose in this step because the default track selection was the first track in the work rather than the track that the player was playing when "New Timeline..." was selected. Finally, it was a bit daunting for users when the timeline actually opened since there was no indication of the next steps to take to get started diagramming.

Playback & Timepoints

Some minor issues occurred with playback while using the timeline tool. For instance, two users were confused as to which set of playback controls to use. User [5] tried to control the timeline playback with the playback controls on the audio player while user [7] tried to control playback on the Timeline window when the Edit Bubbles dialog box (which also contains a set of playback controls) was open.

Another issue occurred when users hit the Stop button rather than the Pause button, an action which caused the slider to return to the beginning of the timeline rather than stopping in place. Also, some users tried to use the space bar to stop/start playback (rather than add a timepoint) because they felt that was a more standard use of the space bar in a media player. User pair [3,4] felt there should be a keyboard shortcut to stop/start playback.

A couple bugs also occurred in relation to playback. One involved the play button, which did not change to a pause icon when clicked. The second issue happened when the timeline would not playback through a particular bubble for no apparent reason. In order to fix the problem, the user deleted the higher bubble level and playback resumed through the lower bubbles.

In terms of adding timepoints, there was minor confusion by users who thought that double-clicking would add a timepoint.

Grouping/Deleting

A major problem occurred for user [7] when he tried to delete bubbles. Instead of selecting a bubble and pressing "Delete" he instead dragged the timepoint signifying the boundary of the desired bubble to the edge of an adjacent bubble. By doing this, the bubble was, in effect, hidden from view rather than actually deleted from the timeline.

In terms of grouping, novice computer users had difficulty using Shift-click to group two or more bubbles together. More advanced users generally had no problems inferring that this was the action to take to select more than one bubble at a time.

A minor issue occurred when a user deleted a large group of bubbles in order to re-bubble and consequently erased all annotations associated with those bubbles at the same time. Although the user could have used the Undo function to retrieve them he did not and proceeded on with the task despite the loss.

Finally, it was apparent that the "Group" option was hard to find in the Timeline → Bubbles submenu for one user. However, there are other grouping methods, including a right-click menu with a group option, as well as a Group button on the interface.

Labels/Annotations

The biggest problem users had with bubble labels occurred when the label added was too long to be displayed in the bubble. In this case, the label displayed defaulted to "-" which provided no indication of the label added. A printout of the timeline also displayed the bubble label as just a "-". Another visibility difficulty occurred when users selected dark colors for bubbles. Any labels within the dark colored bubbles were hard to read since the only font color available for labels is black. As far as adding labels or annotations, it was not immediately clear to some users that the "Edit..." button was the correct means to get to the Edit Bubbles dialog box. As well, there was minor confusion about the difference between a label and an annotation. User [6], for example, assumed that the label was part of the annotation because the annotation pane was titled "Annotation" even though both the label and annotation are displayed within that pane in the format "Label: Annotation". As well, one user attempted to click inside the annotations pane in order to edit the annotation.

Color

Most users enjoyed working with the colors in the timeline tool. Indeed, one even commented that the use of color would be "the biggest selling point" [3]. However, the final participant was color blind and had issues with the default colors. He immediately had to change the default bubble level colors so he could distinguish between bubbles and levels.

A couple minor issues with color included the fact that if an outermost bubble is set to the color white, then it is invisible unless selected since there is no outline around the bubble. In this same vein, a selected bubble is always highlighted. When highlighted, it appears as a slightly different color and so it makes it difficult to select further colors based on the base color of the selected bubble (see Figures 7a and 7b).

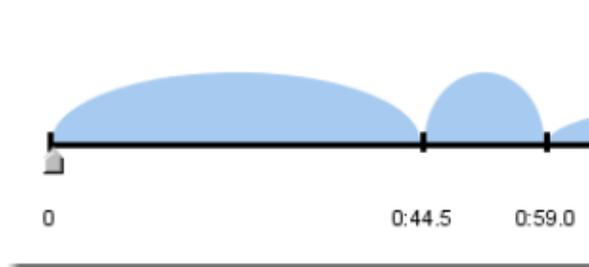


Figure 7a – Invisible white bubble

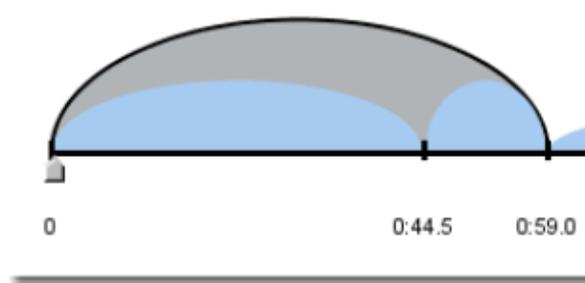


Figure 7b – Invisible white bubble highlighted

Exporting to Webpage

A major issue occurred when users tried to print out a timeline that had been exported to a Webpage and half of the timeline image was cut off on the print out, which was only one page in size. A further minor issue was that some information on the .html page was deemed extraneous. Mostly, this was Container and Timepoint information, which although unnecessary for student use, is important for faculty grading of timelines. Also, the timepoint information is provided in milliseconds which made it difficult to translate into hours, minutes or seconds.

Other

Other issues with the timeline included the fact that there are many icons/controllers in close proximity to the actual timeline (e.g. hand, timepoint controls, arrow, scrubber). It was difficult for users to grab the correct item. Most often, there was accidental grabbing of timepoints instead of the scrubber. As well, one's mouse must be right over the scrubber in order to move it.

Finally, no users ever adjusted the size of the timeline display, but some commented that it would be nice to be able to stretch it out.

Paired vs. Individual

Paired users tended to utilize V2 in a much more exploratory and informal fashion and were more talkative [to each other] during sessions. Conversely, individual users tended to be more task-focused and likely to ask the facilitator for help. The exploratory of Variations2 use may in fact be more typical in the library and computer lab settings in which students work and actually use both Variations and Variations2. Results of the facilitator's previous Variations use observations indicate that it is common for students to work in the library or labs in groups or with a partner to complete listening tasks for a class assignment.

Satisfaction Ratings

Participants were asked fill out an 11-question Satisfaction Survey after completing their tasks (see Appendix, p. 23). The survey was identical to that used in the version 1.0 round of usability tests. Each question asked users to rate their experience with the system by circling a number on a 1-7 continuum. Question topics ranged from general system satisfaction to inquiries about specific V2 components and processes such as navigation and window management. Negative adjectives were placed at the low end of the continuum (1) while positive adjectives were placed at the high end (7). Thus, a lower mean score for a particular question indicates a lower satisfaction rating. Consolidated results of the satisfaction ratings are presented in Table 2. Each response is marked with a "♦" in its corresponding

rating score column. Mean, or average, scores as well as median (most frequent rating) scores are also shown.

Table 2: Satisfaction Survey Results for Variations2 version 2.0

Question	Ratings							Score	
	1	2	3	4	5	6	7	Mean	Median
1. Overall, I found Variations2:	Terrible			Wonderful				6.0	6.0
					◆	◆◆◆◆	◆		
	Difficult			Easy				5.43	6.0
				◆	◆◆	◆◆◆◆			
	Frustrating			Satisfying				5.86	6.0
					◆	◆◆◆◆◆			
	Dull			Stimulating				5.86	6.0
				◆◆◆	◆◆	◆◆			
Slow			Fast				5.57	5.0	
				◆◆◆◆	◆◆	◆			
2. Navigating Variations2 and its components was:	Difficult			Easy				5.43	5.0
					◆◆◆◆	◆◆◆			
3. Tasks could be performed in a straight-forward manner:	Never			Always				5.57	6.0
				◆	◆◆	◆◆◆◆	◆		
4. My location within Variations2 at any given moment was:	Never apparent			Always apparent				6.14	6.0
					◆	◆◆◆◆◆	◆◆		
5. Characters (letters, type,	Hard to read			Easy to read				6.71	7.0

fonts) in Variations2 are:					◆		◆ ◆ ◆ ◆ ◆		
6. Organization of information in Variations2 is:	Confusing			Clear				5.86	6.0
			◆	◆ ◆	◆	◆ ◆ ◆			
7. The number of screens and/or windows open at any one time in Variations2 is:	Difficult to deal with			Easy to manage				6.29	6.0
				◆	◆ ◆ ◆	◆ ◆ ◆			

V. Recommendations

Recommended Variations2 design changes are listed in Table 5 and organized by system components. Each recommendation is assigned a severity rating that should determine the priority given to fixing the issue. Severity ratings are as follows:

High – Issue prevents users from making progress or led to severe mistakes.

Medium – Issue causes confusion, inefficiency, or minor mistakes.

Low – Issue causes slight amounts of confusion or dissatisfaction.

Bug – System was not functioning properly or was an external issue.

Table 5 – Version 2.0 Issues, Recommendations, and Severity Ratings

Issue	Recommendation(s)	Severity Rating
Searching		
When search returns no results, there is no indication that the problem may lie within the media format or key signature selection.	<ul style="list-style-type: none"> Add another line or two to the 'no results' list of fields that says whether the current key signature and/or media format selection is not returning any matches. Reset the key signature and media format fields when user tries next search. 	High
"No search results" screen does not help user get to closest search matches. User must go back to initial search screen and try a modified or new query.	<ul style="list-style-type: none"> Provide list of closest possible matches and allow user to link to them. Provide more informative suggestions for revised search query such as "Check the spelling of your query terms." or "Try removing term(s) from a field in order to broaden your search." 	Medium

No indication that the system is searching or processing when a search takes a long time (e.g. a search for Creator = "Schubert" since there is a substantial amount of Schubert in the system).	<ul style="list-style-type: none"> • Add a message in search window that indicates "searching..." once Search button is pressed. • Provide an hourglass icon during search time. 	Medium
Work Title is probably more important than Performer in the order of search fields and therefore out of order.	<ul style="list-style-type: none"> • Change order of search fields on Basic/Advanced tabs so that Work Title field comes before Performer field. • Keep key signature dropdown inline with Work Title field. 	Medium
It was not clear that clicking on a Schubert piece would bring up the entire lied book in the score viewer.	<ul style="list-style-type: none"> • Consider designing player and viewer so that excerpted parts of works are shown if the user wishes. 	Low
Software does not have a professionally-designed visual appearance.	<ul style="list-style-type: none"> • Hire a graphic designer. • Look at similar types of software to get ideas for better visual design. • Prototype some design ideas and run them by users during next round of testing. 	Low
Search for Creator = "Lennon & McCartney" returned a network error message.	<ul style="list-style-type: none"> • Fix the code causing this problem, likely to do with the "&" character in the search query. 	Bug
Audio Player		
Purpose of the Form tab is unclear.	<ul style="list-style-type: none"> • Remove the Form tab. • Structure contents of the Form tab so that it is clearly displaying information different from the Recording tab. 	Low
No option to repeat tracks.	<ul style="list-style-type: none"> • Consider adding this option to the player window, perhaps above or below Track View radio buttons. 	Low
Score Viewer		
--Difficult to see bookmarks in the Schubert score because the whole score is so large and users placed the bookmarks fairly close together. --Also difficult to click on a bookmark for navigation purposes.	<ul style="list-style-type: none"> • Provide an "excerpt" or "zoom" feature so that users may choose to work with just a certain portion of a large work (e.g. a songbook; similar to timeline excerpting). • Add radio buttons to allow user to choose to display Total, Work, etc. similar to player View Options. 	Medium

All score functions must be accessed via menus or interface with the mouse.	<ul style="list-style-type: none"> • Add right-click options for printing, bookmarking, etc. • Mention shortcuts on menus or in appropriate pane (e.g. Zoom) 	Medium for advanced users; Low for novice users
It appeared that items were open/expanded in the Score tab that should not have been since user had never clicked on those songs. Cause: Score tab tree opens/closes based on page navigation via slider or "Prev" and "Next" buttons.	<ul style="list-style-type: none"> • Consider eliminating this feature for particularly large works (e.g. songbooks). This feature has been known to cause a system crash if user navigates too quickly through lengthy portions of the work. • No change. 	Low/Bug
--Page numbering was off when score page bookmarked was p. "0". --Exported bookmark link did not work if bookmarked page was p. "0".	<ul style="list-style-type: none"> • Fix code causing this problem. 	Bug
Printing		
Print out appearance: --Margins in score print outs were very wide on one piece. --Smaller notes were blurry in a print out of symphony score.	<ul style="list-style-type: none"> • Add feature to allow user to set score print margins. • Make sure digitization is clear. • Add option for user to "sharpen" images, possible via zooming. 	Low
Bookmarking		
There is no way to access the Bookmarking help page because the Edit Bookmarks window has no menus.	<ul style="list-style-type: none"> • Add a button to the Edit Bookmarks window which will open the bookmarking help page. 	High
Difficult to find the "Export..." function since it is accessible only within the Edit Bookmarks window.	<ul style="list-style-type: none"> • Add an "Export..." option to the Bookmarks menu in the main window. 	Medium
User accidentally erased all bookmarks.	<ul style="list-style-type: none"> • Add an alert icon to the error message dialog. • Reword error message to list # of bookmarks being deleted. 	Medium
Bookmarks are ordered in the order they are input, rather than in numerical order if in a score or songbook.	<ul style="list-style-type: none"> • Consider recoding so that pages are added to the bookmark list in numerical order. • Add an option to the Edit Bookmarks window to allow numerical ordering if a user wants that. • Add an "Order" button to the Edit Bookmarks window that automatically reorders bookmarks numerically. 	Low
First part of heading/title of bookmark was the title of the songbook rather than the song which	<ul style="list-style-type: none"> • No change. 	Low

was bookmarked. User must rename each bookmark to differentiate between songs.		
Attempts to print bookmarked pages from the Edit Bookmarks window. (this may involve pressing the "Export..." button in error)	<ul style="list-style-type: none"> Add a "Print..." button in the Edit Bookmark's window. Perhaps next to "Import..." and "Export..." buttons. 	Low
Timeliner		
A. Opening/Starting		
<p>--Confusion about which window to open a new timeline from. Causes questions such as, "Why is 'New Timeline' option grayed out in Search window?"</p> <p>--User tried to open a new timeline from an already open timeline file, rather than the audio player which was playing the piece she had just searched for.</p> <p>--Assumption that a timeline would begin from a score (since form diagramming on paper is typically done in this manner).</p>	<ul style="list-style-type: none"> Ungray the "New Timeline..." option in the Search Score Viewer & Opus Window 'File' menus. Add a dialog message if user clicks on the "New Timeline..." option in the wrong window that directs user to open a timeline in the Audio Player window. Revise the timeline help page so that description within "Create New Timeline" section initially says "You may create a new timeline only from the Audio Player window." Add ellipses (...) to all grayed out options in File menus that lead to opening of a new window. 	High
User must select the desired track in the New Timeline... window because it defaults to the first track in the work rather than the track that was playing when "New Timeline..." was selected.	<ul style="list-style-type: none"> Have track selection default to what was playing when "New Timeline..." was selected. 	Medium
User must rename title in "New Timeline..." window because it is not identical to selected track title.	<ul style="list-style-type: none"> Input the track name as the default title when user selects "New Timeline..." 	Medium
Timeline appearance is a bit daunting when initially opened. No indication of next steps to take.	<ul style="list-style-type: none"> Add an introductory dialog pane that explains briefly what to do. Window would be able to be clicked off and user could decide whether to show that window on next startup or to have it go away permanently. 	Low
B. Playback		
Slider kept going back to beginning of timeline because user pushed stop instead of pause.	<ul style="list-style-type: none"> Have a tooltip come up when user mouses over "Stop" button that says "Stop & Rewind". 	Medium
--User tried to control Timeline	<ul style="list-style-type: none"> Change appearance of 	Low

<p>playback with the playback controls in the Audio Player.</p> <p>--Attempts to playback on Timeline window when the Edit Bubbles dialog box was open.</p>	<p>timeline playback controls so they appear associated with the timeline.</p> <ul style="list-style-type: none"> • Have a separate playback pane that can attach or be associated with various components rather than built-in. Sort of a universal playback control. 	
<p>--Tried to use space bar to start/stop playback (rather than add a timepoint) because that is more standard in a media player.</p> <p>--No short-cut key for starting/stopping playback.</p>	<ul style="list-style-type: none"> • Consider making spacebar start/stop playing. • Incorporate some kind of keyboard shortcut for playback and indicate that there is a shortcut on the interface. 	Low
<p>Would not playback through a particular bubble for no apparent reason. Happened several times. Then user deleted the higher bubble level and it seemed to fix itself and play through the lower bubbles.</p>	<ul style="list-style-type: none"> • Fix code that is causing this problem. 	Bug
<p>Play icon did not change to pause icon when clicked.</p>	<ul style="list-style-type: none"> • Fix code that is causing this problem. 	Bug
C. Timepoints		
<p>Not clear how to input a timepoint while the music is not playing. In general, difficult to discern methods of adjusting playback/non-playback while adding timepoints.</p>	<ul style="list-style-type: none"> • Perhaps add some playback control to timeline window in the timepoints pane or by playback controls (in addition to having it available in the "Edit Properties" window) 	Medium
<p>Thought that double-clicking a bubble/timeline would add a timepoint.</p>	<ul style="list-style-type: none"> • No change. 	Low
D. Grouping/Deleting		
<p>Deleted bubble by dragging timepoint to edge of adjacent bubble so that bubble, in effect, is hidden (rather than actually deleted), rather than using Delete button.</p>	<ul style="list-style-type: none"> • Have bubbles "join" if their edges touch. • Warning message appears that asks the user if he would like to join those bubbles or delete one. 	Medium
<p>Shift-click not intuitive for grouping for novice computer users.</p>	<ul style="list-style-type: none"> • Add tooltip over "Group" button that explains how to Shift-click to select more than 1 bubble. • Add text on "Group" bubble that says "Shift-click" or "Press Shift" 	Medium
<p>User deleted a big group of bubbles in order to "re-bubble" and consequently all annotations were deleted along with it with no way to</p>	<ul style="list-style-type: none"> • Incorporate a warning message if annotations are going to be deleted when Delete is pressed. 	Low

retrieve them (e.g. all lyrics, which were annotated in lower level bubbles).	<ul style="list-style-type: none"> • Store annotation texts in a file that can be retrieved later. 	
Group option hard to find in the Timeline → Bubbles submenu.	<ul style="list-style-type: none"> • No change. 	Low
E. Labels/Annotations		
When a label was too long, the bubble simply showed “-”	<ul style="list-style-type: none"> • Truncate text so that something displays in bubble. 	High
Not immediately clear that the “Edit...” button was access point for adding labels and annotations.	<ul style="list-style-type: none"> • Remove “Edit..” button from Bubbles pane; remove “Edit Label...” button from Timepoints pane; Rename Annotations pane “Bubble Label: Annotation”; Place “Add/Edit...” button in this pane; Rearrange buttons associated with Annotation pane that are currently on the right side. 	High
Dark colored bubbles render text/labels unreadable.	<ul style="list-style-type: none"> • Incorporate fonts that are “color-sensitive” • Don’t allow dark bubble colors. • No change – user can fix this. 	Medium
--Difficulty distinguishing between annotations and labels (as in, they added labels and didn’t realize they could also annotate or that annotation was something different.) --Assumption that label was part of the annotation (rather than needing its own field) because the pane is entitled “Annotation” and the label is also in the annotation pane.	<ul style="list-style-type: none"> • Add some explanatory text in “Edit Bubbles” window or on Timeline window in annotation pane. • Retitle Annotation pane “Label: Annotation” 	Low
Attempts to click inside the Annotations pane to edit.	<ul style="list-style-type: none"> • Add feature so that double-clicking on annotation pane opens “Edit Bubbles” window. • No change. 	Low
Little use of the arrows to move from bubble to bubble within the Edit Bubbles window.	<ul style="list-style-type: none"> • Add some more explanatory text inside “Edit Bubbles” window that explains process of playback and bubble selection within that window. 	Low
F. Color		
Color blind user had to immediately change default bubble level colors.	<ul style="list-style-type: none"> • Create color schemes users may choose, including schemes that are appropriate for color-blind users. • Indicate which color schemes are appropriate for color-blind users. 	Medium
Unless it is selected, a white-colored	<ul style="list-style-type: none"> • Outline the top-level bubble. 	Low

bubble is invisible if it is the top-level bubble.	<ul style="list-style-type: none"> No change. 	
A selected bubble is highlighted. This changes its color, and makes it difficult to select further colors.	<ul style="list-style-type: none"> Instead of highlighting entire bubble, simply outline it. 	Low
G. Web Page		
When printed from the .html exported page, the timeline image was cut off. Only 1 page printed, with half of the timeline displayed.	<ul style="list-style-type: none"> Adjust code so that image prints on one page. Don't indent pictures. Include landscape recommendation. 	High
On .html page, info about Container, and Timepoint list deemed confusing and unnecessary. Mostly due to milliseconds format of times (e.g. 16697).	<ul style="list-style-type: none"> Change template for time display in .html pages from milliseconds to hours/minutes/seconds. Remove container information in exported page. Make container information available only to instructors. 	Low
H. Other		
--Hard to grab the scrubber. --Accidental grabbing of timepoints instead of scrubber. --Confusion due to many icons/controllers in close proximity (e.g. hand, timepoint controls, arrow, scrubber).	<ul style="list-style-type: none"> Enlarge scrubber grab area so that user can move scrubber without accidentally grabbing timepoints. 	High
Never adjusted the timeline size (and then comments that it would be nice to be able to stretch the timeline!).	<ul style="list-style-type: none"> Have arrows on either end of timeline that change state when user mouses over. 	Low

VI. Future Testing

Future testing and use of the Variations2 system should incorporate the following aspects:

- Conduct usability testing on the following:
 - Macintosh version of Variations2
 - Opus Window component
 - Expanded help pages and [Variations2 User Guide](#)
- Variations2 version 2.0 should also be pilot tested in fall 2003 courses to gain better understanding of the contextual usage of the system for both faculty and students.
- System design recommendations gleaned from the current as well as past usability tests should be consolidated and their completion status checked in terms of relevance to current version.

VII. Appendices

I. Demographic Information

1. Are you Male / Female? (Circle one)
2. What is your major? (e.g. composition, voice, piano):

3. What is your age? _____
4. What is your native language? _____
5. How many hours per week do you spend using a computer?
[____ 0-5] [____ 6-10] [____ 11-20] [____ 21 or more]
6. Rate your computer experience on the following systems by circling 1-5 below:
 - a. PC: Novice 1 2 3 4 5 Expert
 - b. Macintosh: Novice 1 2 3 4 5 Expert
7. Approximately how often do you use Variations?
____ once a month or less
____ once every two weeks
____ once a week
____ 1-5 times a week
____ more than 5 times a week
9. When did you begin using Variations? Mark the most accurate choice.
____ within the last month
____ within the last year
____ within the last two years
____ more than two years ago
10. What activities do you mainly use Variations for? (e.g. listening to a class reserve list, preparing for recital, personal listening, etc.)

11. Have you participated in any prior Variations2 tests? (circle one) YES NO

II. Tasks

Instructions: Complete all three parts below. Please say aloud any comments you have as you work through the tasks and interact with the system.

Part A

Motivation: You need to find a Schubert piece that you can analyze for a theory assignment.

1. Within Variations2, find a work by Schubert which has an online score available. Write the title in the space below.
2. Open the score in the score viewer and adjust the score appearance according to your preferences.
3. Bookmark three (3) score pages of interest.
4. Print out two (2) of your bookmarked score pages.

Part B

Motivation: Next week's theory quiz requires that you analyze and diagram a Beatles song and turn it in before the end of class. You decide to use the Variations2 Timeline tool to practice for the quiz.

1. Create a new timeline for the Beatles song entitled "Norwegian Wood".
2. Diagram the structure of the piece by creating bubbles.
3. If appropriate, group a set of bubbles to show larger formal structure.
4. Use labels and/or colors to show relationships between the sections.
5. Add annotations to some bubbles to describe some musical feature of that section.
6. Print out the timeline you just created.

Part C

Motivation: One of the pieces you have been working with is the Beatles song entitled "I Will". You open the timeline file, a work in progress, to continue diagramming the structure.

1. Adjust the timeline for "I Will" so that it more correctly reflects the structure of the song. You may want to change colors, labels, timepoints, etc.
2. Save the timeline after you are done making adjustments.
3. Print out the timeline you just saved.

III. Satisfaction Survey

For each question below, circle a number from 1-7. The number should best represent your feelings about the Variations2 experience that you described in Section II. Feel free to write additional comments in the space provided below.

1. Overall, I found Variations2:

Terrible	1	2	3	4	5	6	7	Wonderful
Difficult	1	2	3	4	5	6	7	Easy
Frustrating	1	2	3	4	5	6	7	Satisfying
Dull	1	2	3	4	5	6	7	Stimulating
Slow	1	2	3	4	5	6	7	Fast

2. Navigating Variations2 and its components was:

Difficult 1 2 3 4 5 6 7 Easy

3. Tasks could be performed in a straight-forward manner:

Never 1 2 3 4 5 6 7 Always

4. My location within Variations2 at any given moment was:

Never apparent 1 2 3 4 5 6 7 Always apparent

5. Characters (letters, type, fonts) in Variations2 are:

Hard to read 1 2 3 4 5 6 7 Easy to read

6. Organization of information in Variations2 is:

Confusing 1 2 3 4 5 6 7 Clear

7. The number of screens and/or windows open at any one time in Variations2 is:

Difficult to deal with 1 2 3 4 5 6 7 Easy to manage

Additional Comments (use back of page if you need more space):
