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# Screen design with dynamic symmetry: A discovery

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## Abstract

Hambidge's study of Greek art convinced him that the secret of the beauty of Greek design was in the conscious utilization of dynamic symmetry – the law of natural design based upon the symmetry of growth in man and in plants. While our study of dynamic symmetry that underlies 150 real screens shows an unmistakable use of plan schemes of the proportioning system in 61% of them, few adhere absolutely to it. Nevertheless, the evidence leads to the conclusion that layout was probably approximated by designers of great native ability whose sense of form is highly developed.

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*Keywords:* Screen design; Screen aesthetics; Systems of proportion; Dynamic symmetry

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## 1. Evidence of Greek use of dynamic symmetry

All through the 19th century architects and archaeologists have tried to find out explanations and keys for the beautiful proportions of Greek and Gothic monuments; to find, that is, whether their builders had explicit rules and canons of

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proportion and design, or whether the perfection of these monuments was just due to a mixture of luck and good taste. Hambidge set out to remove every element of doubt concerning whether Greek artisans made use of the principles of proportion called by him “dynamic symmetry” (Hambidge, 1926). His study of Greek art do provide evidence of the most incredible sensitivity and intelligent.

The clue to the manipulation of proportion in agreement with the Greek concept of symmetry was found by Hambidge in Plato’s *Theaetetus*, and this in the sentence concerning numbers which are non-commensurable; meaning irrational numbers like  $\sqrt{2}$ ,  $\sqrt{3}$ ,  $\sqrt{5}$ , etc. (Hambidge, 1924). The importance of the use of these irrational proportions, and the accuracy of Hambidge’s interpretation, are confirmed by the sentence of Vitruvius, suggesting that the geometrical proportion or analogia is the tool necessary for the realisation of symmetry or harmonious commodulation, and that the subtler questions of symmetry “have to be solved” by the use of irrational proportions” (Ghyka, 1952).

In his book *Dynamic Symmetry: The Greek Vase* (Hambidge, 1920), through painstaking measurements of vases in North American museums, Hambidge demonstrated his rediscovery of the use of the golden section and root rectangles in ancient Greek artistic design. Fig. 1 shows the analysis by Hambidge of a Greek vase. *The Parthenon and Other Greek Temples: Their Dynamic Symmetry* (Hambidge, 1924) is another important work by Hambidge. Rarely cited by modern authors, it uses measurements of the Parthenon and other Greek temples to

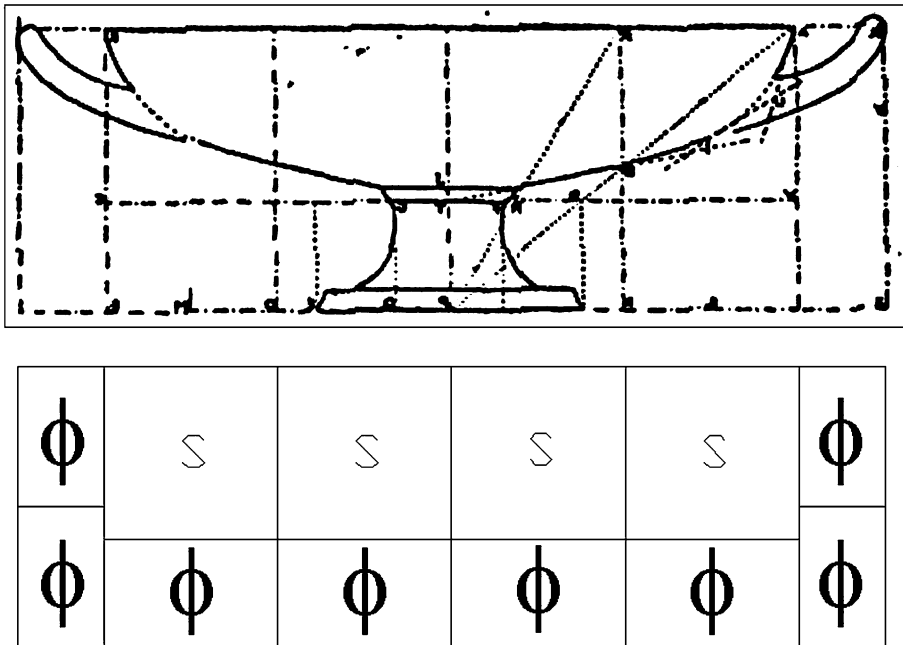


Fig. 1. Greek vase, harmonic analysis.

convincingly demonstrate the ancient reliance on the golden section, logarithmic spirals, and root rectangles in the construction of sacred architecture. Fig. 2 shows Hambidge's analysis of the Parthenon's frontal view.

Did the Greeks really use this stuff? The measurements of the Parthenon and other Greek temples are quite compelling that these proportions were used at least in those cases. Do modern designers utilise the principle? One can see the symmetry in the master works of Albrecht Durer, Seurat, Mondrian, Leonardo da Vinci, and Salvador Dali. Without being taught, paper makers, printers, and designers have gravitated to the basic principle of dynamic symmetry for centuries. We may never know what makes the symmetry so naturally pleasing. But, it is interesting to note that in natural and human inspired design the symmetry shows up over and over. In this short paper, we show how the symmetry occurs in screen design.

## 2. Modern day applications of dynamic symmetry

Among those whose work in dynamic symmetry he influenced decisively are Maxfield Parrish (painting), Anne Carleton (painting), John Steuart Curry (painting), Paul Sample (painting), George Bellows (painting), Emil Bistram (painting), Diego Rivera (painting), José Clemente Orozco (painting), Jeffrey Smart (painting), Mary Crovatt Hambidge (decorative art), Edward B. Edwards (decorative art), Gary Bernstein (photography), Ed Buffaloe (photography), Edward Steichen (photography), Walter Dorwin Teague (in architecture and product design), Tony Smith (in architecture, painting, and sculpture), William Buck Stratton (sculpture), etc.

The rectangle of the facade may be subdivided into these simple elements

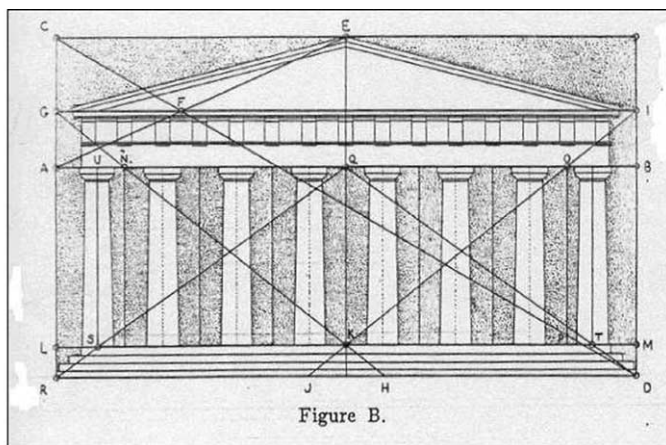
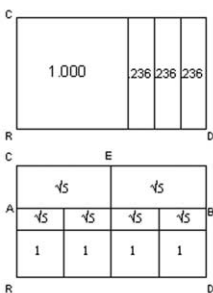


Fig. 2. The Parthenon, harmonic analysis.

In photographic composition the principle of dynamic symmetry is used as a guide for determining the best location for the centre of interest. A good location for the centre of interest is found by drawing a diagonal line from one corner to an opposite corner. Then, draw a second line perpendicular to the first from a third corner. The intersections of the lines are the location for the centre of interest.

This approach is very simplistic compared to complex models applied to painting. Hambidge invented a web of diagonal lines that formed a six-pointed star within a rectangle. The lines forming the star traverse the rectangle diagonally from corner to corner and from upper and lower corners to points centred on the long sides. The resultant star establishes proportional areas within the rectangle; by using the diagonal lines as guides the artist is able to set the elements of a painting in a correct relationship to each other and tie them into a unified composition. In *Roadmenders' Camp* Curry organised all the elements of his picture to accommodate the Hambidge star.

### 3. Hambidge theory of dynamic symmetry

Hambidge defined two types of rectangular shapes: static and dynamic. The rectangles such as  $3/2$ ,  $5/4$ ,  $8/5$ ,  $3$ , etc., of which the proportions show only rational numbers, are called static rectangles. The rectangles such as  $\sqrt{2}$ ,  $\sqrt{3}$ ,  $\sqrt{5}$ ,  $\sqrt{5/2}$ ,  $\phi = (\sqrt{5} + 1)/2$ , showing irrational numbers in their proportions, are called dynamic rectangles.

In order to obtain dynamic symmetry or commodulation, we must use the dynamic rectangles. The rectangles  $\sqrt{1}$  and  $\sqrt{4}$  are at the same time static and dynamic. The rectangles  $\phi$ ,  $\phi^2$ ,  $\sqrt{\phi}$  and  $\sqrt{5}$  are all related, but they are not related to  $\sqrt{2}$  and  $\sqrt{3}$ . The root-two and root-three rectangles will not unite with each other or with any other rectangles except those composed of even squares. The root-four rectangle is unique in that it may be divided statically or dynamically or may be united with

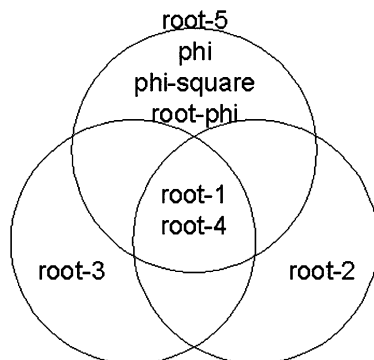


Fig. 3. Relationships between dynamic rectangles.

the other base rectangles of the system. Root-four may be divided into terms of root two, root three, or root five. Fig. 3 shows the relationships between these rectangles.

This notion of relationship between rectangles, that is, between their proportions, derives its importance from a law of composition already mentioned by L.B. Alberti and rediscovered by Hambidge, the “law of the non-mixing of proportions or themes in a plane composition”; in such a composition, only “related” themes must be used, “antagonistic” themes must not be mixed (the analogy with music is correct, the modulations of proportions is similar to the passing from one related scale or key to another) (Ghyka, 1952).

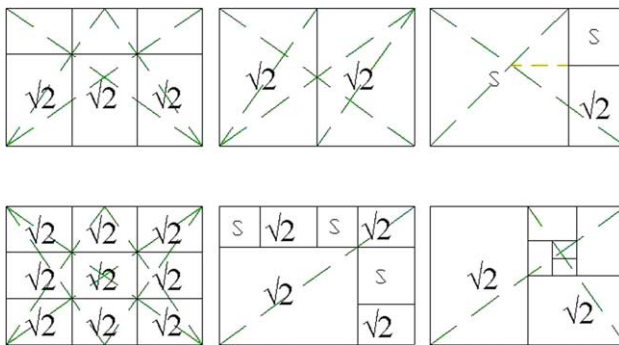


Fig. 4. Harmonic decompositions in the  $\sqrt{2}$  theme.

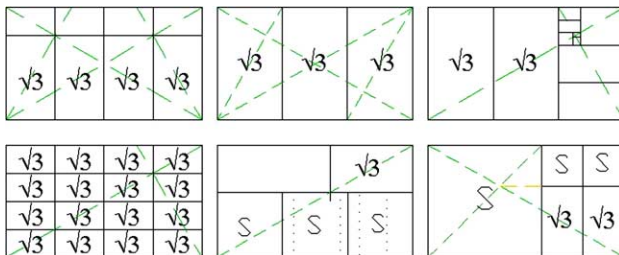


Fig. 5. Harmonic decompositions in the  $\sqrt{3}$  theme.

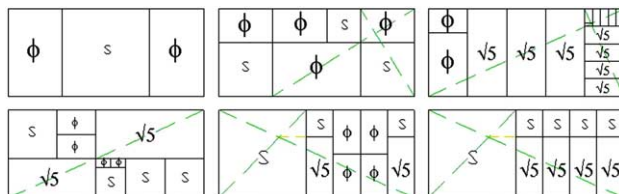


Fig. 6. Harmonic decompositions in the  $\sqrt{5}$  theme.

Hambidge pointed out that the diagonal of a rectangle when joined with a perpendicular leading to one of the corners created a “harmonic subdivision”. The diagrams in Figs. 4–6 show how this method can be applied in order to obtain the harmonic subdivisions of the square and of the dynamic rectangles  $\sqrt{2}$ ,  $\sqrt{3}$  and  $\sqrt{5}$ . Hambidge’s method takes into consideration the fact that the overall frame of a two-dimensional composition is generally a rectangle or a complex of rectangles. In his method of harmonic subdivision, these rectangles are subdivided by the diagonal. That is, we draw a diagonal, and from one of the opposite summits a perpendicular to this diagonal; this can be repeated with the other diagonal, and from the points of intersection between diagonals, perpendiculars and sides, are drawn parallels to the sides. This process can be continued with many variations, and every diagram thus obtained produces a perfect commodulation of surfaces, and obeys the “law of non-mixing themes”.

#### 4. Screen designs illustrating the use of dynamic symmetry

This study examined whether dynamic symmetry has been applied to screen design in the past. It began with the selection of 150 screens from a variety of multimedia systems. We sampled screens that represented a wide variety of design characteristics, from simple to complex and from plain to sophisticated. Screens with many graphic features and a sophisticated design appearance were chosen, as well as ones with few text elements and little sophistication. Next, Hambidge’s method of analysis was applied to the 150 screens to determine whether any of them could be analysed in accordance with the principles of dynamic symmetry.

Of the many examples of screen design which have been examined, about 57% show dynamic schemes based upon root five; about 4% upon root two, 0% upon root three, and the remainder are either uncertain or are clearly static (see Appendix A). These results are quite surprising, given the expectation that their designers were not aware of dynamic symmetry. Although Hambidge’s technique has been around for a long time, never do we hear any discussion about its use as a screen design tool.

The root rectangles of dynamic symmetry are found in those cases. But, it would seem that the designers did not consciously use it. Fig. 7 shows an example of the use of the root rectangles. But, the fit is not particularly good.

A final explanation of the special appeal of the dynamic rectangles arrived at mathematically or intuitively, has yet to be given, as far as we know. Perhaps there is no simple, easy explanation beyond the assumption that the laws of proportion are, in some strange way, inherent in visual perception. Convinced that great art was produced as the result of the use of the fundamental laws of nature, in his book *Pattern and Design with Dynamic Symmetry*, Edwards (1932) wrote, “It is the superior sensitiveness to, and perhaps knowledge of these laws, whether they be of rhythm, form, proportion, or color, or of sound, which distinguishes the artist”.

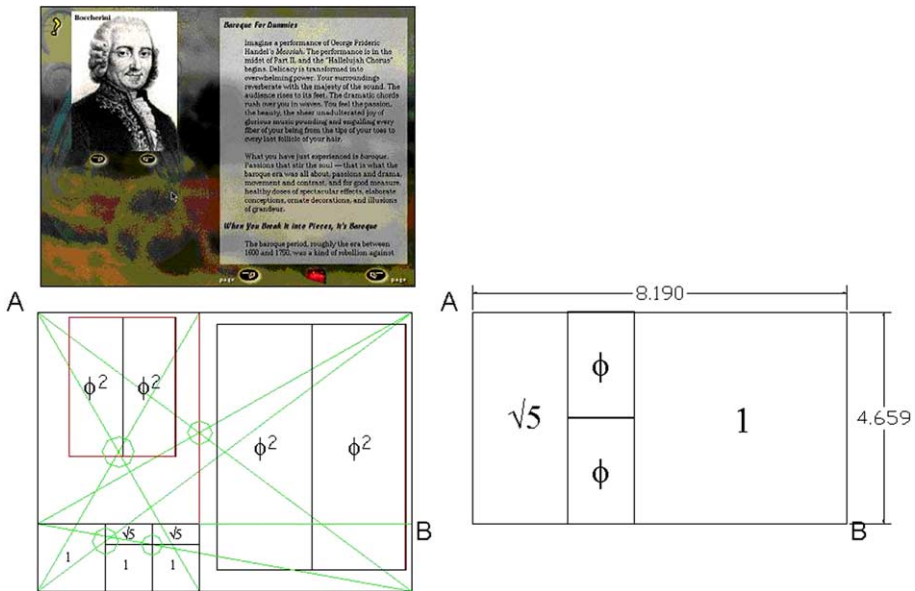


Fig. 7. A screen illustrating the root-five proportion.

### 5. Dynamic symmetry: A natural design law

Without being taught, designers have gravitated to the fundamental shapes of dynamic symmetry for centuries. We may never know what makes the shapes so naturally pleasing. But, it is interesting to note that in natural and human inspired design the dynamic proportions show up over and over.

Using this information can help determine how to lay things out in a visually pleasing way. It can also give parameters for computer displays. It may be argued that design may become an intellectual process, but it is just as important for the designer to understand the laws of harmoniously related forms and areas, as it is for the musical composer to be familiar with the laws of harmony and counterpoint. As Edwards stated, “If there are laws of harmony and proportion which can be learned and applied in the planning of our work, it is foolish to argue that these laws should not be used because they do not allow us sufficient scope for the free employment of our innate artistic ability. Great art is impersonal, and the great artist will willingly accept the limits imposed by a logical use of known essential principles”.

### Acknowledgements

The research reported here was supported by IRPA Grant 191/9636/0012.

**Appendix A.** Results of applying Hambidge’s method of analysis to 150 screens used in the study

No.	Multimedia system	Screen name	Screen source	Symmetry	Theme	Category
1	MS BookShelf 99	Facts & Figures	Microsoft Corp.	Static/Uncertain	–	Reference
2	MS Encarta Encyclopedia 99	Interactives 2	Microsoft Corp.	Dynamic	$\sqrt{2}$	Reference
3	MS Encarta Encyclopedia 99	Media Gallery	Microsoft Corp.	Dynamic	$\sqrt{5}$	Reference
4	MS Encarta Encyclopedia 99	Microscope	Microsoft Corp.	Dynamic	$\sqrt{5}$	Reference
5	MS Encarta Encyclopedia 99	Virtual Tours	Microsoft Corp.	Dynamic	$\sqrt{5}$	Reference
6	MS Encarta Encyclopedia 99	Advertisement on Deluxe Edition	Microsoft Corp.	Slight error	$\sqrt{5}$	Reference
7	MS Encarta Encyclopedia 99	Virtual Tours (Dam)	Microsoft Corp.	Dynamic	$\sqrt{2}$	Reference
8	MS Encarta Encyclopedia 99	Research Organizer	Microsoft Corp.	Static/Uncertain	–	Reference
9	MS Encarta Encyclopedia 99	Collages	Microsoft Corp.	Static/Uncertain	–	Reference
10	MS Encarta Encyclopedia 99	Biodiversity	Microsoft Corp.	Dynamic	$\sqrt{2}$	Reference
11	MS Encarta Encyclopedia 99	World Languages	Microsoft Corp.	Static/Uncertain	–	Reference
12	MS Encarta Encyclopedia 99	InterActivities	Microsoft Corp.	Slight error	$\sqrt{5}$	Reference
13	MS Encarta Encyclopedia 99	Media Gallery 2	Microsoft Corp.	Static/Uncertain	–	Reference
14	MS Encarta Encyclopedia 99	Mind Maze	Microsoft Corp.	Dynamic	$\sqrt{5}$	Reference
15	MS Virtual Globe 99	Map	Microsoft Corp.	Dynamic	$\sqrt{5}$	Reference
16	MS Virtual Globe 99	Architecture of the World	Microsoft Corp.	Dynamic	$\sqrt{5}$	Reference
17	MS Virtual Globe 99	Map Gallery	Microsoft Corp.	Dynamic	$\sqrt{5}$	Reference
18	MS Virtual Globe 99	Name That Place	Microsoft Corp.	Slight error	$\sqrt{5}$	Reference
19	MS Virtual Globe 99	United Kingdom Map	Microsoft Corp.	Dynamic	$\sqrt{5}$	Reference
20	MS Virtual Globe 99	World Tours	Microsoft Corp.	Static/Uncertain	–	Reference
21	Britannica CD 99	Browse Titles 1	–	Dynamic	$\sqrt{5}$	Reference
22	Britannica CD 99	Browse Titles 2	–	Dynamic	$\sqrt{5}$	Reference
23	Britannica CD 99	Analyst	–	Dynamic	$\sqrt{5}$	Reference
24	Britannica CD 99	Spotlights 1	–	Dynamic	$\sqrt{5}$	Reference



25	Britannica CD 99	Spotlights 2	–	Dynamic	$\sqrt{5}$	Reference
26	Britannica CD 99	Spotlights 3	–	Dynamic	$\sqrt{5}$	Reference
27	Britannica CD 99	Timelines 1	–	Dynamic	$\sqrt{5}$	Reference
28	Britannica CD 99	Timelines 2	–	Dynamic	$\sqrt{5}$	Reference
29	Britannica CD 99	Compass	–	Dynamic	$\sqrt{5}$	Reference
30	Church Builder	Calling	<a href="http://www.softekinc.com/products/churchbuilder/screenshot2.asp">http://www.softekinc.com/products/churchbuilder/screenshot2.asp</a>	Static/Uncertain	–	Business & Economy
31	Church Builder	Dial Properties 1	<a href="http://www.softekinc.com/products/churchbuilder/screenshot2.asp">http://www.softekinc.com/products/churchbuilder/screenshot2.asp</a>	Dynamic	$\sqrt{5}$	Business & Economy
32	Church Builder	Frame Main	<a href="http://www.softekinc.com/products/churchbuilder/screenshot2.asp">http://www.softekinc.com/products/churchbuilder/screenshot2.asp</a>	Dynamic	$\sqrt{5}$	Business & Economy
33	Church Builder	Wizard 1	<a href="http://www.softekinc.com/products/churchbuilder/screenshot2.asp">http://www.softekinc.com/products/churchbuilder/screenshot2.asp</a>	Static/Uncertain	–	Business & Economy
34	Church Builder	Wizard 2	<a href="http://www.softekinc.com/products/churchbuilder/screenshot2.asp">http://www.softekinc.com/products/churchbuilder/screenshot2.asp</a>	Static/Uncertain	–	Business & Economy
35	Church Builder	Wizard 3	<a href="http://www.softekinc.com/products/churchbuilder/screenshot2.asp">http://www.softekinc.com/products/churchbuilder/screenshot2.asp</a>	Static/Uncertain	–	Business & Economy
36	Church Builder	Wizard 4	<a href="http://www.softekinc.com/products/churchbuilder/screenshot2.asp">http://www.softekinc.com/products/churchbuilder/screenshot2.asp</a>	Static/Uncertain	–	Business & Economy
37	Church Builder	Wizard 5	<a href="http://www.softekinc.com/products/churchbuilder/screenshot2.asp">http://www.softekinc.com/products/churchbuilder/screenshot2.asp</a>	Static/Uncertain	–	Business & Economy
38	Church Builder	Wizard 6	<a href="http://www.softekinc.com/products/churchbuilder/screenshot2.asp">http://www.softekinc.com/products/churchbuilder/screenshot2.asp</a>	Static/Uncertain	–	Business & Economy

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**Appendix A. (continued)**

No.	Multimedia system	Screen name	Screen source	Symmetry	Theme	Category
39	Jsnake Game	Play	–	Static/Uncertain	–	Entertainment
40	1999 Grolier Multimedia Encyclopedia	Gallery	Grolier Incorporated	Dynamic	$\sqrt{5}$	Education
41	1999 Grolier Multimedia Encyclopedia	Interactives	Grolier Incorporated	Dynamic	$\sqrt{5}$	Education
42	1999 Grolier Multimedia Encyclopedia	Interactives/Human Body Systems	Grolier Incorporated	Dynamic	$\sqrt{5}$	Education
43	1999 Grolier Multimedia Encyclopedia	Interactives/The World	Grolier Incorporated	Dynamic	$\sqrt{5}$	Education
44	IBM Worldbook 1999	Search By Topic	IBM	Dynamic	$\sqrt{5}$	Education
45	IBM Worldbook 1999	Search	IBM	Dynamic	$\sqrt{5}$	Education
46	IBM Worldbook 1999	Cyber Safari	IBM	Static/Uncertain	–	Education
47	Big Business	Customer Card	–	Static/Uncertain	–	Business & Economy
48	Debik	Marine Mammal	–	Static/Uncertain	–	Education
49	Debik	Mammoth Cave	–	Static/Uncertain	–	Education
50	Model Maker 5	Coding	–	Dynamic	$\sqrt{5}$	Computers & Internet
51	Model Maker 5	CfgStore	–	Dynamic	$\sqrt{5}$	
52	SRN 19	The Total Heart	MMU	Dynamic	$\sqrt{5}$	Reference
53	SRN 2-11	Turkey	MMU	Dynamic	$\sqrt{5}$	Reference
54	Canadian Pacific Railway	Search	www.amgl.com/sample_work_cpr.html	Dynamic	$\sqrt{5}$	Government
55	Canadian Pacific Railway	Shortline Tracking (System 1.0)	www.amgl.com/sample_work_cpr.html	Dynamic	$\sqrt{5}$	Government
56	Canadian Pacific Railway	Introduction	www.amgl.com/sample_work_cpr.html	Dynamic	$\sqrt{5}$	Government
57	Canadian Pacific Railway	RBMN Terminals	www.amgl.com/sample_work_cpr.html	Dynamic	$\sqrt{5}$	Government
58	Canadian Pacific Railway	Entire System Map	www.amgl.com/sample_work_cpr.html	Dynamic	$\sqrt{5}$	Government

59	Australian Pay Tax Calculator 3.0.1	Tax From Gross Calculator	<a href="http://www.ozemail.com.au/~ghardwic/screenshots.html">www.ozemail.com.au/~ghardwic/screenshots.html</a>	Dynamic	$\sqrt{5}$	Business & Economy
60	Epi Conf	-	-	Dynamic	$\sqrt{5}$	Arts & Humanities
61	Bose Surround CAD Kiosk	Layout	<a href="http://www.traylormm.com/samples/scad/">www.traylormm.com/samples/scad/</a>	Dynamic	$\sqrt{5}$	Business & Economy
62	Boomerangs – Echoes of Australia	What Boomerangs Are Used For	<a href="http://www.mindvision.com.au/boomerang/">www.mindvision.com.au/boomerang/</a>	Dynamic	$\sqrt{5}$	Education
63	Boomerangs – Echoes of Australia	Where Boomerangs Come From	<a href="http://www.mindvision.com.au/boomerang/">www.mindvision.com.au/boomerang/</a>	Dynamic	$\sqrt{5}$	Education
64	Boomerangs - Echoes of Australia	Jigsaw	<a href="http://www.mindvision.com.au/boomerang/">www.mindvision.com.au/boomerang/</a>	Dynamic	$\sqrt{5}$	Education
65	Boomerangs – Echoes of Australia	Banner	<a href="http://www.mindvision.com.au/boomerang/">www.mindvision.com.au/boomerang/</a>	Dynamic	$\sqrt{5}$	Education
66	Classical Music for Dummies	History	IDG Books Worldwide, Inc. C.A. USA	Dynamic	$\sqrt{5}$	Reference
67	Classical Music for Dummies	Glossary	IDG Books Worldwide, Inc. C.A. USA	Dynamic	$\sqrt{5}$	Reference
68	Classical Music for Dummies	Play Music	IDG Books Worldwide, Inc. C.A. USA	Dynamic	$\sqrt{5}$	Reference
69	Classical Music for Dummies	Main	IDG Books Worldwide, Inc. C.A. USA	Dynamic	$\sqrt{5}$	Reference
70	Classical Music for Dummies	Program Listing	IDG Books Worldwide, Inc. C.A. USA	Dynamic	$\sqrt{5}$	Reference
71	Classical Music for Dummies	Pachelbel	IDG Books Worldwide, Inc. C.A. USA	Dynamic	$\sqrt{5}$	Reference
72	Alive 1.4 for beOS	About	Mike Bultrowicz	Dynamic	$\sqrt{5}$	Computers & Internet
73	Alive 1.4 for beOS	Options	Mike Bultrowicz	Static/Uncertain	-	Computers & Internet
74	Alive 1.4 for beOS	Main	Mike Bultrowicz	Dynamic	$\sqrt{5}$	Computers & Internet
75	Word Command	Flash Card	<a href="http://www.lexio.com/">http://www.lexio.com/</a>	Yes	$\sqrt{5}$	Reference
76	Word Command	Main Menu	<a href="http://www.lexio.com/">http://www.lexio.com/</a>	Static/Uncertain	-	Reference

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**Appendix A. (continued)**

No.	Multimedia system	Screen name	Screen source	Symmetry	Theme	Category
77	Word Command	Quiz	<a href="http://www.lexio.com/">http://www.lexio.com/</a>	Dynamic	$\sqrt{2}$	Reference
78	Word Command	Screen Saver	<a href="http://www.lexio.com/">http://www.lexio.com/</a>	Static/Uncertain	–	Reference
79	Word Command	Word List	<a href="http://www.lexio.com/">http://www.lexio.com/</a>	Dynamic	$\sqrt{5}$	Reference
80	Server Bridge	Choose Applications	<a href="http://www.serverbridge.com">www.serverbridge.com</a>	Dynamic	$\sqrt{2}$	Computers & Internet
81	Server Bridge	Find User	<a href="http://www.serverbridge.com">www.serverbridge.com</a>	Dynamic	$\sqrt{2}$	Computers & Internet
82	Czech & Speake 03	Shaving Requisites	source: <a href="http://www.vrx.net.au/czech_speake/">www.vrx.net.au/czech_speake/</a>	Static/Uncertain	–	Business & Economy
83	Czech & Speake 02	Aromatic Toiletries	source: <a href="http://www.vrx.net.au/czech_speake/">www.vrx.net.au/czech_speake/</a>	Dynamic	$\sqrt{5}$	Business & Economy
84	Czech & Speake 01	Main	source: <a href="http://www.vrx.net.au/czech_speake/">www.vrx.net.au/czech_speake/</a>	Dynamic	$\sqrt{5}$	Business & Economy
85	Automated Psychological Survey System	New Session Profile		Dynamic	$\sqrt{5}$	Social Science
86	Automated Psychological Survey System	Questionnaire		Static/Uncertain	–	Social Science
87	CCNA	Logo Screen	<a href="http://www.amg1.com/sample_work.html">http://www.amg1.com/sample_work.html</a>	Dynamic	$\sqrt{5}$	Business & Economy
	CCNA	Your Host	<a href="http://www.amg1.com/sample_work.html">http://www.amg1.com/sample_work.html</a>	Dynamic	$\sqrt{5}$	Business & Economy
88						
89	CCNA	Best Front Page	<a href="http://www.amg1.com/sample_work.html">http://www.amg1.com/sample_work.html</a>	Static/Uncertain	–	Business & Economy
90	CCNA	Best Front Page 2	<a href="http://www.amg1.com/sample_work.html">http://www.amg1.com/sample_work.html</a>	Dynamic	$\sqrt{5}$	Business & Economy
91	CDROM of the Himalayas	People	<a href="http://www.world2c.net/screens.htm">http://www.world2c.net/screens.htm</a>	Static/Uncertain	–	Reference
92	CDROM of the Himalayas	Ama Dablam	<a href="http://www.world2c.net/screens.htm">http://www.world2c.net/screens.htm</a>	Static/Uncertain	–	Reference
93	CDROM of the Himalayas	Holy Mount	<a href="http://www.world2c.net/screens.htm">http://www.world2c.net/screens.htm</a>	Static/Uncertain	–	Reference

94	CDROM of the Himalayas	Young Monks	<a href="http://www.world2c.net/screens.htm">http://www.world2c.net/screens.htm</a>	Static/Uncertain	–	Reference
95	DIA Multimedia catalogue	Main Menu		Dynamic	√5	Science
96	DIA Multimedia catalogue	Select Picture		Static/Uncertain	–	Science
97	DIA Multimedia catalogue	GP3TU		Static/Uncertain	–	Science
98	DIA Multimedia catalogue	Diagram		Dynamic	√5	Science
99	DIA Multimedia catalogue	Emission control unit		Dynamic	√5	Science
100	DIA Multimedia catalogue	Leak Proof		Dynamic	√5	Science
101	Univ. of Sydney	Faculty of Law	<a href="http://law.usyd.edu.au/index.html">http://law.usyd.edu.au/index.html</a>	Static/Uncertain	–	Education
102	Univ. of Sydney	Faculty of Medicine	<a href="http://www.vrx.net.au/vrx/sydmed/medrom1.html">http://www.vrx.net.au/vrx/sydmed/medrom1.html</a>	Dynamic	√5	Education
103	Univ. of Sydney	Faculty of Medicine – map	<a href="http://www.vrx.net.au/vrx/sydmed/medrom1.html">http://www.vrx.net.au/vrx/sydmed/medrom1.html</a>	Dynamic	√5	Education
104	Univ. of Sydney	Faculty of Medicine – Menu	<a href="http://www.vrx.net.au/vrx/sydmed/medrom1.html">http://www.vrx.net.au/vrx/sydmed/medrom1.html</a>	Dynamic	√5	Education
105	Univ. of Sydney	Faculty of Medicine – Online Resources	<a href="http://www.vrx.net.au/vrx/sydmed/medrom1.html">http://www.vrx.net.au/vrx/sydmed/medrom1.html</a>	Dynamic	√5	Education
106	Univ. of Sydney	Faculty of Medicine – Virtual Tour	<a href="http://www.vrx.net.au/vrx/sydmed/medrom1.html">http://www.vrx.net.au/vrx/sydmed/medrom1.html</a>	Dynamic	√5	Education
107	Univ. of Sydney	Faculty of Medicine – Sydney	<a href="http://www.vrx.net.au/vrx/sydmed/medrom1.html">http://www.vrx.net.au/vrx/sydmed/medrom1.html</a>	Static/Uncertain	–	Education
108	Univ. of Sydney	Faculty of Medicine – Courses	<a href="http://www.vrx.net.au/vrx/sydmed/medrom1.html">http://www.vrx.net.au/vrx/sydmed/medrom1.html</a>	Dynamic	√5	Education
109	Univ. of Sydney	Faculty of Medicine – Video	<a href="http://www.vrx.net.au/vrx/sydmed/medrom1.html">http://www.vrx.net.au/vrx/sydmed/medrom1.html</a>	Dynamic	√5	Education
110	Univ. of Sydney	Faculty of Medicine – Video Selection	<a href="http://www.vrx.net.au/vrx/sydmed/medrom1.html">http://www.vrx.net.au/vrx/sydmed/medrom1.html</a>	Static/Uncertain	–	Education
111	Learn to Sail with Multimedia	Parts of a Sailboat	<a href="http://www.learntosail.net/">http://www.learntosail.net/</a>	Dynamic	√5	Reference
112	Learn to Sail with Multimedia	Knots	<a href="http://www.learntosail.net/s">http://www.learntosail.net/s</a>	Static/Uncertain	–	Reference
113	Learn to Sail with Multimedia	How it works	<a href="http://www.learntosail.net/">http://www.learntosail.net/</a>	Static/Uncertain	–	Reference
114	Learn to Sail with Multimedia	Rigging the Boat	<a href="http://www.learntosail.net/">http://www.learntosail.net/</a>	Static/Uncertain	–	Reference

(continued on next page)

**Appendix A. (continued)**

No.	Multimedia system	Screen name	Screen source	Symmetry	Theme	Category
115	Maxwell	Energie	<a href="http://www.esat.kuleuven.ac.be/elen/maxwell/screenshots/">http://www.esat.kuleuven.ac.be/elen/maxwell/screenshots/</a>	Dynamic	$\sqrt{5}$	Science
116	Maxwell	Introduction	<a href="http://www.esat.kuleuven.ac.be/elen/maxwell/screenshots/">http://www.esat.kuleuven.ac.be/elen/maxwell/screenshots/</a>	Dynamic	$\sqrt{5}$	Science
117	Maxwell	Introduction 2	<a href="http://www.esat.kuleuven.ac.be/elen/maxwell/screenshots/">http://www.esat.kuleuven.ac.be/elen/maxwell/screenshots/</a>	Static/Uncertain	–	Science
118	Maxwell	Introduction 3	<a href="http://www.esat.kuleuven.ac.be/elen/maxwell/screenshots/">http://www.esat.kuleuven.ac.be/elen/maxwell/screenshots/</a>	Static/Uncertain	–	Science
119	Maxwell	Laboratory menu	<a href="http://www.esat.kuleuven.ac.be/elen/maxwell/screenshots/">http://www.esat.kuleuven.ac.be/elen/maxwell/screenshots/</a>	Dynamic	$\sqrt{5}$	Science
120	Maxwell	Menu	<a href="http://www.esat.kuleuven.ac.be/elen/maxwell/screenshots/">http://www.esat.kuleuven.ac.be/elen/maxwell/screenshots/</a>	Dynamic	$\sqrt{5}$	Science
121	The Express	–		Static/Uncertain	–	Education
122	The Darkest Hour	–		Dynamic	$\sqrt{5}$	Reference
123	The McGruff Files	Dangerous Strangers		Static/Uncertain	–	Entertainment
124	Edit Quiz	Video Review Segment		Dynamic	$\sqrt{5}$	Education
125	Edit Quiz	Questions		Dynamic	$\sqrt{5}$	Education
126	Reading with Peter Cotton Tail	Condor's Secret		Dynamic	$\sqrt{5}$	Education
127	Animals	Picture menu		Static/Uncertain	–	Education
128	Animals	Orangutan		Dynamic	$\sqrt{5}$	Education
129	Requirements for Life Nutrients	The Carbon Cycle		Dynamic	$\sqrt{5}$	Health
130	National Coastline Survey	Image viewer				Government
131	Key Issues for Decision Makers			Static/Uncertain	–	Business & Economy

132	1998 World Book Encyclopedia	Search by Word	Static/Uncertain	–	Reference
133	Sackville Water Fowl Park	Main Menu	Static/Uncertain	–	Entertainment
134	Art Education	Contrast	Dynamic	$\sqrt{5}$	Education
135	Sports Museum		Static/Uncertain	–	Reference
136	Ireland's Interactive Environment		Static/Uncertain	–	Reference
137	ELLE	Eating In?	Static/Uncertain	–	Miscellaneous
138	Elizabeth Brown	Main	Static/Uncertain	–	Advertising
139	Dealing with Objections	Quiz	Static/Uncertain	–	Social Science
140	Three Stages of Robbery	Menu	Dynamic	$\sqrt{5}$	Society and Culture
141	Game	Play Screen	Static/Uncertain	–	Entertainment
142	Birds	Northern Shoveler	Static/Uncertain	–	Reference
143	Birds	White Throated Sparrow	Static/Uncertain	–	Reference
144	South Australian	Menu	Dynamic		Miscellaneous
145	Training Resources		Static/Uncertain	–	Education
146	Multimedia Training Centre	Welcome	Dynamic	$\sqrt{5}$	Education
147	Begin your New Life	Welcome to Ancient Egypt	Static/Uncertain	–	Entertainment
148	Missy Eliot	Main	Static/Uncertain	–	Entertainment
149	Missy Eliot	Bio	Dynamic	$\sqrt{5}$	Entertainment
150	Missy Eliot	Missyography	Static/Uncertain	–	Entertainment

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