The 3-way ANOVA did not return any main effect, even for Age (Table 6.7). There was a Vocalization x Age interaction with $p<0.04$. The 13-year-olds averaged 151 fixations over the un-vocalized conditions and 152 fixations over the vocalized ones, while the 16-year-olds averaged 146 fixations over the un-vocalized conditions and 140 fixations over the vocalized conditions. In other words, the 13-year-olds had similar fixations while reading fully vocalized text while the 16-year-olds had fewer.

<table>
<thead>
<tr>
<th>Condition</th>
<th>SUV</th>
<th>TUV</th>
<th>DUv</th>
<th>SV</th>
<th>TV</th>
<th>DV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>13</td>
<td>155</td>
<td>150</td>
<td>148</td>
<td>152</td>
<td>148</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>13</td>
<td>33</td>
<td>31</td>
<td>29</td>
<td>30</td>
<td>28</td>
</tr>
<tr>
<td>Standard Error</td>
<td>13</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Average</td>
<td>16</td>
<td>142</td>
<td>146</td>
<td>150</td>
<td>140</td>
<td>140</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>16</td>
<td>30</td>
<td>30</td>
<td>31</td>
<td>26</td>
<td>36</td>
</tr>
<tr>
<td>Standard Error</td>
<td>16</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 6.5: Averages for the number of fixations that each group had.

Number of Regressions

The number of regressions was calculated for every subject across the 6 different conditions (Table 6.8). This was the sum of all backward saccades that occurred within the target area. Regressions on white space that are less than 75 milliseconds were excluded. Regressions that were above 1 sec were included for the same reasons as mentioned in the Number of Fixations earlier. These fixations were 1 or 2 or even 3 fixations, but at least one of them was a regression. Therefore, they are still included.

The 3-way ANOVA showed two interesting phenomena (Table 6.9). The first is as one can expect given the role that the vowels play in disambiguating texts: the numbers show a main effect for the Vocalization variable with $p<0.009$. Fewer regressions took place in the vocalized conditions. The second interesting phenomenon is the lack of a main effect for Age. The 13-year-old group was reading the same material as the older group, so the difficulty level is higher and the reading skills are lower. With such conditions, one usually expects a higher number of regressions, and yet the numbers did not show a reliable effect there. Of course, one cannot deduce that Age had no effect on the number of regressions, merely that the effect was not found.

<table>
<thead>
<tr>
<th>Condition</th>
<th>SUV</th>
<th>TUV</th>
<th>DUv</th>
<th>SV</th>
<th>TV</th>
<th>DV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>13</td>
<td>25</td>
<td>23</td>
<td>23</td>
<td>23</td>
<td>21</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Standard Error</td>
<td>13</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Average</td>
<td>16</td>
<td>21</td>
<td>23</td>
<td>23</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>16</td>
<td>13</td>
<td>13</td>
<td>12</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Standard Error</td>
<td>16</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 6.8: Averages for the number of regressions showing fewer regressions in the vocalized conditions.
Table 6.9 Inferential statistics showing a main effect for Vocalization.

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>np²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocalization</td>
<td>1</td>
<td>11.47</td>
<td>0.001</td>
<td>0.14</td>
</tr>
<tr>
<td>Style</td>
<td>2</td>
<td>0.78</td>
<td>0.46</td>
<td>0.02</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>0.88</td>
<td>0.35</td>
<td>0.01</td>
</tr>
<tr>
<td>Vocalization x Style</td>
<td>2</td>
<td>1.00</td>
<td>0.34</td>
<td>0.03</td>
</tr>
<tr>
<td>Vocalization x Age</td>
<td>1</td>
<td>2.98</td>
<td>0.09</td>
<td>0.04</td>
</tr>
<tr>
<td>Style x Age</td>
<td>2</td>
<td>0.48</td>
<td>0.62</td>
<td>0.01</td>
</tr>
<tr>
<td>Vocalization x Style x Age</td>
<td>2</td>
<td>0.66</td>
<td>0.52</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Average Distance of Forward Saccades

The average distance of forward saccades was calculated for every subject across the 6 different paragraphs (Table 6.10). This was the average distance, in pixel measure, of all forward saccades that occurred within the target area in the first pass. Return sweeps, movements bring the eye to the beginning of the next line, were not included. Saccades that related to fixations that occurred after a regression were discounted up to the point where new text was being read. In effect, this average is measuring the subjects’ forward eye movements while reading text for the first time.

In eye movement studies related to the Latin script, the unit of measurement of saccade length is in the number of characters covered where the text is set in a monospaced typeface with all characters being the same width. The typefaces used in this experiment are proportionately spaced, as are all Arabic fonts in use today. To try to make them into a monospaced version would have seriously affected the

Table 6.10 Average distances for the forward saccades.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Suv</th>
<th>Tuv</th>
<th>Duv</th>
<th>Sv</th>
<th>Tv</th>
<th>Dv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>13</td>
<td>77</td>
<td>73</td>
<td>73</td>
<td>75</td>
<td>73</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>13</td>
<td>10</td>
<td>9</td>
<td>11</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Standard Error</td>
<td>13</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Average</td>
<td>16</td>
<td>80</td>
<td>75</td>
<td>75</td>
<td>76</td>
<td>74</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>16</td>
<td>10</td>
<td>12</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Standard Error</td>
<td>16</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 6.11 Inferential statistics showing a main effect for Vocalization and Style.
The average distance of forward saccades was calculated for every subject across the 6 different paragraphs (Table 6.15). This was the average of the length, in pixel measure, of all regressive saccades that occurred within the target area. Regressive movements that bring the eye from the beginning of a line to the end of the previous line, were not included. Saccades that were larger than 200 pixels, corresponding to 4 or 5 words, were discounted. The reason for this was that these were more likely a conscious decision to re-read a large part of the text most likely due to comprehension reasons. These would have offset the averages and increased the standard deviation and errors in ways that make drawing conclusions that much harder. Another type of regressive saccades that were discounted was one where saccades went back across one or more lines. The pixel measure of these regressions (measured via the respective positions on the x-axis) is not indicative of the actual length of the saccade since it went over many lines. Therefore, this type was also not included in the regressive saccade calculation. Note that these regressions were still counted in the number of regressions data. As with the forward saccade calculation, a saccade length by character count is planned for future research.

The 2-way ANOVA showed a main effect for the Vocalization variable with p=0.03, where the presence of vocalization marks reduced the lengths of regressions (Table 6.16). As with the forward saccades, the statistics were recalculated to account for the difference in proportion (Table 6.17). The new results show a main effect for the Vocalization variable with p=0.035 (Table 6.18). Vocalization reduced the regressive saccade length for both age groups. The data also showed a main effect for Style with p=0.014. Post-hoc analysis revealed that Simplified had reliably shorter regressive saccades than both Traditional and Dynamic, but Traditional and Dynamic were not reliably different from one another. This effect for Style had not been present in the original analysis. No interactions were found.
زعموا أن غديرا كان فيه ثلاث سمكات: كيستينة التأني، وأكيسم منها، وعاجزة. وكان ذلك الغدير بنجوة من الأرض، لا يكاد يقربه أقرببه نهر جار. فاتفق أنّه اجتاز بذلك النهر صيادان، فأبصرتا الغدير، فتوعدا أن يرهب بشباكهما، فيصيدا ما فيهم السَّمك.
فسمعت السَّمكأت قولهما. فأما أكيسمهن، فابقولهما، فخرجت من المكان الذي يدخل.
زعموا أن غديرا كان فيه ثلاث سمكات: كيستينة التأني، وأكيسم منها، وعاجزة. وكان ذلك الغدير بنجوة من الأرض، لا يكاد يقربه أقرببه نهر جار. فاتفق أنّه اجتاز بذلك النهر صيادان، فأبصرتا الغدير، فتوعدا أن يرهب بشباكهما، فيصيدا ما فيهم السَّمك.
فسمعت السَّمكأت قولهما. فأما أكيسمهن، فابقولهما، فخرجت من المكان الذي يدخل.
زعموا أن غديرا كان فيه ثلاث سمكات: كيستينة التأني، وأكيسم منها، وعاجزة. وكان ذلك الغدير بنجوة من الأرض، لا يكاد يقربه أقرببه نهر جار. فاتفق أنّه اجتاز بذلك النهر صيادان، فأبصرتا الغدير، فتوعدا أن يرهب بشباكهما، فيصيدا ما فيهم السَّمك.
فسمعت السَّمكأت قولهما. فأما أكيسمهن، فابقولهما، فخرجت من المكان الذي يدخل.

Fig. 6.14 A comparison of line width of the 3 styles.
Fig. 6.17 The adjusted average distance of regressions for the two age groups.

The Experiment

Average Distance of Regressive Saccades: Descriptive Statistics - New Values

<table>
<thead>
<tr>
<th>Condition</th>
<th>Suv</th>
<th>Tuv</th>
<th>Duv</th>
<th>Sv</th>
<th>Tv</th>
<th>Dv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>13</td>
<td>-67</td>
<td>-66</td>
<td>-64</td>
<td>-61</td>
<td>-63</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>13</td>
<td>10</td>
<td>14</td>
<td>12</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Standard Error</td>
<td>13</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Average</td>
<td>16</td>
<td>-68</td>
<td>-69</td>
<td>-68</td>
<td>-68</td>
<td>-67</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>16</td>
<td>13</td>
<td>17</td>
<td>14</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>Standard Error</td>
<td>16</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Chart 6.7 The averages of the two groups and the standard error.

Average Distance of Regressive Saccades with Width Correction - New Values

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>P</th>
<th>p</th>
<th>np²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocalization</td>
<td>1</td>
<td>4.624</td>
<td>0.035</td>
<td>0.062</td>
</tr>
<tr>
<td>Style</td>
<td>2</td>
<td>4.511</td>
<td>0.014</td>
<td>0.116</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>2.089</td>
<td>0.153</td>
<td>0.029</td>
</tr>
<tr>
<td>Vocalization x Style</td>
<td>2</td>
<td>0.499</td>
<td>0.666</td>
<td>0.012</td>
</tr>
<tr>
<td>Vocalization x Age</td>
<td>1</td>
<td>1.228</td>
<td>0.272</td>
<td>0.017</td>
</tr>
<tr>
<td>Style x Age</td>
<td>2</td>
<td>0.015</td>
<td>0.985</td>
<td>0.000</td>
</tr>
<tr>
<td>Vocalization x Style x Age</td>
<td>2</td>
<td>1.838</td>
<td>0.167</td>
<td>0.051</td>
</tr>
</tbody>
</table>

Fig. 6.18 The adjusted inferential statistics showing a main effect for Vocalization and Style.

Average Distance of Regressive Saccades: Inferential Statistics - New Values

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>P</th>
<th>p</th>
<th>np²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocalization</td>
<td>1</td>
<td>5.30</td>
<td>0.02</td>
<td>0.07</td>
</tr>
<tr>
<td>Style</td>
<td>2</td>
<td>1.28</td>
<td>0.28</td>
<td>0.04</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>2.79</td>
<td>0.10</td>
<td>0.04</td>
</tr>
<tr>
<td>Vocalization x Style</td>
<td>2</td>
<td>0.08</td>
<td>0.92</td>
<td>0.00</td>
</tr>
<tr>
<td>Vocalization x Age</td>
<td>1</td>
<td>2.27</td>
<td>0.14</td>
<td>0.03</td>
</tr>
<tr>
<td>Style x Age</td>
<td>2</td>
<td>0.36</td>
<td>0.70</td>
<td>0.01</td>
</tr>
<tr>
<td>Vocalization x Style x Age</td>
<td>2</td>
<td>1.09</td>
<td>0.34</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Chart 6.8 The averages of the two groups and the standard error.

Regressive Saccade Distance

*Age 13
*Age 16

Fig. 6.16 Inferential statistics showing a main effect for Vocalization.
Discussion

Does the complexity of word formation affect legibility? Or, more accurately, how do the varying degrees of complexity of the Naskh typographic styles affect reading speed? Does the addition of short vowels aid or hinder reading? These questions are at the heart of this research.

The hypothesis posits that the complexity of the word form (as can be seen in the different interpretations of Naskh) decreases reading speed and that this effect is more evident in younger readers. The presence of vocalization marks removes ambiguity, and therefore the hypothesis expects a lower number of regressions in vocalized texts. So what do the results show?

The Effect of Style on Reading Measures

The results show that readers have shorter fixation durations while reading in the Simplified Style condition than in either the Traditional or Dynamic one. The data does not show an effect on reading time, number of fixations, or number of regressions. Do shorter fixation durations imply a more legible design? As proposed in chapter 5, legibility is the ease with which words are encoded.

Shorter fixation durations equate with faster encoding. Shorter fixation durations are then the result of a more legible typeface design, as has already been shown in chapter 5. The design of the three different versions of the Alhadeam typeface is modeled on the basis that each typeface is representative of its genre. Simplified Alhadeam stands for Simplified Naskh, and so forth. It is then the case, that when all other design variables are held constant Simplified Naskh is more legible than both the Traditional and Dynamic versions of Naskh. This result is in line with the hypothesis, where one can clearly see longer fixation durations with the more complex styles. This result stands to reason: the more complex the visual stimulus, the longer one needs to encode it. This is also in keeping with the body of evidence discussed in chapter 5. Style also has an effect on the length of regressive saccades where the Simplified condition has shorter regressive saccade lengths, and the more complex versions have longer regressions. The implications of this finding are not really clear, but it is possible that the complexity of the word forms results in the need to regress to earlier parts of the text. As discussed in chapter 5, regressions often follow skipped words or mis-located fixations. It is possible, then, that the pattern of mis-located fixations and the complexity of the visual in the Traditional and Dynamic styles necessitates a longer step backwards.

The Effect of Vocalization on Reading Measures

The presence of vocalization marks is a linguistic research element rather than a design one, as the majority of this research is. Previous chapters have shown the intricate relationship between the Arabic script and the Arabic language. Consequently, the study of the Arabic script cannot be taken in isolation of the language it holds within. The role of the vowels in reading Arabic has been a subject of several research studies that have shown opposing results. The chance to investigate, via the intimate view offered by eye movement research, the effectiveness of their inclusion in long reading could not be missed be out on and hence their inclusion as an independent variable.

This inclusion was done for several other reasons as well. One, the presence of the vowels is an added visual complexity that might react differently with the styles. It is possible that the vocalized Dynamic might get to be too crowded, and we would then see an interaction between style and vocalization. The vowels help to disambiguate meaning, and this is why the hypothesis expects lower regressions in vocalized texts. There is also the cost of added visual complexity versus the benefit of clarity of meaning. Which one has a higher cost in terms of mental processing: Linguistic ambiguity or visual complexity? These are tantalizing questions that, though tangential to the role of word shape complexity, are worthwhile endeavors to be sought.

Vocalization was also shown to reduce the number of regressions, also with a strong reliability of p<0.001. This result is in line with the hypothesis and is very clear in logic: Vocalization adds a linguistic layer that clarifies the meaning by disambiguating homographs, and as such eliminates the role of guessing and context referencing that is involved in the reading of Arabic. As discussed in previous chapters, the context of a word plays a large role in its processing given the different array of meanings that a lot of words can have. A study had shown that reading Arabic involves more regressions than reading other languages like English (Gray, 1956). Once this ambiguity is removed, the need for so many regressions would no longer exist. In the reading of English, regressions amount to a total of 10-15% of total saccades. In the results here, the regressive fixations amounted to 15% of the total number of fixations, so it is similar to that in English but on the higher side.

As it turns out, Vocalization shows the largest number of effects. It increases fixation duration for all three styles, and the effect is very reliable with p<0.001 which translates to the result that there is only a 0.1% likelihood that this effect is due to chance. As far as statistics go, this is a very strong number. What does it mean? It basically says that the cost of more visual noise and complexity in the visual stimulus outweighs the benefits of the increased clarity of meaning that a fully vocalized text brings. Or, the addition of vowels made for an unfamiliar setting that tipped the scales. In either case, these results are in line with the one eye movement study that has dealt with the role of vowels in reading Arabic (Roman & Pavard, 1987), and also in line with the majority of studies mentioned in the previous chapter related to the role of vowels in the reading of Arabic text.

It is important to note the role of familiarity here. Though the students were selected from a network of schools where vocalized text was much more common that in other schools, it is still possible that the students were still somewhat more familiar with reading un-vocalized texts. The experiment has tried to reduce the role of familiarity as much as can be reasonably expected within the typographic norms of today. For this factor to be neutralized completely, one would need to test with readers who are equally familiar with both conditions and within the current norms of today, the only type of fully vocalized text that one comes across is in poetry and the Quran. The selected school network offers religious teachings as part of its curriculum (Makki, 2003) and therefore was as close as the ideal as possible.

Even if one were to say that students were more familiar with un-vocalized text, the result still goes to say that if one were to introduce full vocalization to readers today, the vowels will hinder reading rather than add it. It is the norm in teaching Arabic that vowels are first introduced to vocalized text and are then gradually weaned off so as to arrive at a point where text is un-vocalized. Confusing as this might be, this is common practice across the region. Historically speaking, Arabic texts were originally un-vocalized. This is seen in early Quranic manuscripts in the 8th century. Vocalization was introduced when the Arabic language spread out of the peninsula and innovatives started to speak it, and one can see its early forms, as
dots, in the manuscripts from the late 8th or early 9th century (Déroche, 1992, p. 52). Is it possible then, that the early Arabic writers were on to something?

It is interesting here to look at the overall proportion of homophones in Arabic texts, though that number is not readily available. It is possible that their number is not as high, and this is why the benefit of clarity is not making up for the overall cost of more visual complexity.

Vocalized conditions also show shorter forward and regressive saccades. This again goes back to the complexity of the visual: The more complex the visual, the smaller jumps that the eye can make. This is in keeping with the body of evidence shown and discussed in chapter 5.

The Effect of Age on Reading Measures

The experiment shows strong results for the effect of age. The younger group has longer reading times and longer fixation durations. This is to be expected: the younger group was reading the same material as the older one and so the difficulty level is greater for them. Their reading skills are naturally less advanced and that also contributes to slower reading times. The lack of an effect of Age on the number of regressions was surprising, as one would expect that due to the higher difficulty level.

The inclusion of a younger group was meant for one specific purpose: to check if the changing of the Style or Vocalization has different effects across different age groups. The results showed limited interaction there and could only be seen in the number of saccades. If this were a study that primarily dealt with investigating the effect of Age on reading measures then the difficulty level would have been a possible confounding factor, as it was not maintained constant. However, the purpose here is to look for interactions with the other independent variables. It does not matter that the younger readers are slower, what matters is if the Style and Vocalization are interacting to give different results for the two groups, i.e. if the effects of these two variables are not simply additive. As such, only one interaction is statistically reliable, and that is the interaction of Age and Vocalization in the results of the number of fixations.

Interactions

The interesting aspect for testing with several independent variables is the possibility of observing how these interact. Given the experiment setup, there are four possible interactions: Style and Vocalization, Style and Age, Vocalization and age, and Style and Vocalization and Age. The hypothesis expects an interaction between Style and Age, but that is not seen in any of the reading measures. This could imply that both age groups react in similar fashion to the change in styles i.e. Simplified is aiding legibility for both groups without a bigger impact on one or the other. However, the safe conclusion here is to say that no interaction is found for Style and Age, rather than there is no interaction at all. This is also the case for an interaction between Style and Vocalization, and between Style and Vocalization and Age.

Though not specifically outlined in the hypothesis, one could also expect that perhaps the addition of vocalization marks would play different roles across the two age groups. The younger group has less developed reading skills and is reading material that is of a higher difficulty level. The vocalization could possibly help clarify the text. This interaction is observed between Vocalization and Age in the number of fixations. The experiment shows similar fixation numbers for the 13-year old group in both vocalized and un-vocalized texts, but the 16-year old group has fewer fixations in un-vocalized conditions. In other words, the effect of Vocalization changes as the subjects get older and this is reflected in the number of fixations they need to read vocalized and un-vocalized texts.

The Hypothesis Revisited: The Findings

Going back to the original hypothesis, it comprises three proposals:

- The complexity of the word form (as can be seen in the different interpretations of Nasbi) decreases reading speed.
- This effect is expected to be more profound in younger readers.
- The presence of vocalization marks removes ambiguity and therefore decreases the number of regressions.

In terms of the first proposal, the shorter average fixation duration for Simplified goes to prove this point. The more complex styles (Traditional and Dynamic) require longer fixations. This is true for both age groups. The results are not statistically reliable when comparing the averages for Traditional and Dynamic, though when one looks at the results, one can clearly see a trend that the averages for Traditional are smaller than those for Dynamic.

As for the second proposal, that statement cannot be proven with the current data. The inferential statistics show no statistically reliable interaction between Style and Age. As mentioned earlier, this does not mean that there is no interaction, but merely that it could not be found. The reason that this distinction is relevant is that perhaps this experiment setup was not the perfect way to test for this effect. It is possible that if one were to test with a much younger age group who are just starting out to read, then the effect would be more profound. Or simply test with a larger group. As it stands, the fact that all the subjects aged between 13 and 17 benefited from a less complex style would lead one to expect that to be the case for the beginner readers as well. The point of the second proposal is that the benefit would be more marked. Still, the fact that that benefit exists, i.e. the fact that added complexity has a cost in terms of mental processing, is already enough for one to draw conclusions and make recommendations for typographic practices.

The third proposal is strongly confirmed with a marked decrease in the number of regressions in vocalized texts, for both age groups. The hypothesis itself does not specify what expectations to have regarding the role of vowels in reading, other than the number of regressions, though the literature review does clearly point to the same conclusions as found in this study. Vocalization has the largest number of effects, from fixation duration to the number of regressions to both forward and regressive saccade lengths. In effect, Vocalization turns out to be intimately involved with the mechanics of eye movement while reading Arabic. This goes to prove how intricate the relationship between the Arabic language and its vessel is.

The Question of Authenticity

Results that show that a simpler design is easier to read are, in a way, not so surprising. So why are these findings so important in the context of Arabic type design?
There are two reasons for that. The first is related to the effect of technology on the development of typographic forms. The trend, as discussed in previous chapters, has been to simplify the complexity of the manuscript forms in order for them to be represented in print. The varying levels of vertical alignments and the large number of forms that each character can take presented technical challenges that were often hard to resolve. The way in which the shaping of Arabic Naskh has evolved into its most common form: four basic shapes per letter that always connect to each other at the same vertical level, plus a handful of extra ligatures. These technological constraints are no longer there and current technology allows us far more sophistication in how words can be shaped. So we are then faced with the question: do we go back to the manuscript models of shaping or not?

This brings us to the second point. This is the question of what is authentic Arabic? It is a question being raised by prominent type designers today and it boils down to: Are typefaces that are based on manuscript models more authentic, more Arabic, than ones that are simplified? There is a controversy in the world of Arabic typographic design today and that is pertaining to the question of authenticity of reference. The modern designs are generally simplified but there are many who believe that we need to return to classical models. The findings of this legibility research can guide us in answering that question.

Implications for Design and Reading

Looking back at all the results, one can find common themes running across and those are costs and opportunities. Reading is a process that is facilitated by a host of factors such as language skills, intellect, eyesight, and reading conditions such as the clarity of the stimulus, the lighting conditions, etc. The aim of reading is to assimilate written information, whether that is for entertainment, practical purposes, education, or any of many other reasons. The point is, reading is an act that requires the mental processing of a visual stimulus. In the case of reading Arabic, the complexity of the word shaping, as well as the presence of full vocalization, bring an added cost to that mental process. They add an extra cost to word encoding. As such, one can posit that Simplified Naskh is more legible than the traditional versions of Naskh, and that non-vocalized texts, even with the occasional ambiguity with homographs, are still more legible than fully vocalized ones.

The results also show the wealth of opportunities available for the design and setting of Arabic texts. The speed benefits of Simplified Naskh are very advantageous in situations where speed of word reading is essential: on a highway, on a sign, and even in newspapers. The simplification of Naskh was driven by technology, but with this simplification came enhanced speeds of word encoding. The cost of complexity is then offset by the opportunities made possible by Simplified Naskh.

The implications of such findings are important on three levels: aesthetics, linguistics, and information design. The question of aesthetics comes down to that of typographic practices and preferences in design. Looking at the three versions of Naskh, it is not hard to say that the Dynamic version brings with it a level of elegance and beauty of construction that is missing from the Simplified version. This is not to say, that a simplified Naskh cannot look good. That is untrue. However, the poetic and fluid movement of the Dynamic forms cannot be reproduced in the simplified version. That is by nature of its construction. That beauty though comes at a cost of up to 4.7% increase in fixation times. The question then is, when would that form of beauty justify such a loss in word reading speed?

Such a question goes back to the function of the written text. If that was the kind of text that one can take time to read, say a novel or a literary book, the nature of the text calls for that mood of fluid elegance, then yes, that cost is justified. When the nature of the text is less about leisurely enjoyment and more about the acquisition of information, then the simplified forms are more appropriate. When it comes to education, there is a clear benefit in presenting information that students can easily process and again the simplified versions would work best. This is not to say that the different styles cannot be mixed to present different kinds of typographic textures related to how the reader needs to read the text. The use of more complex forms could signify that that specific text is one that the reader needs to stop by and mulit read. It could take on the kind of usage that italics have in Latin texts. Slope aside, true italics in a serif typeface bring with them an added complexity of shape though not of word construction. It is perhaps not a coincidence that Latin typographic norms assigned to the italic a secondary role to that of the upright.

Another situation to consider would be that involving digital displays such as a phone or an e-reader. Screen resolutions are increasing dramatically, but if one were to look at user interfaces, one is still constrained by a limited number of pixels both vertically and horizontally. A simpler design would be more applicable in such a case as the speed of interaction is quite a decisive factor, and the constraints of pixel rendering work in favor of the simpler styles. This is again an opportunity for the design of typefaces that are tailored to improve the reading experience.

In any case, the different versions of Naskh offer a wealth of variation in typographic texture that would be very interesting to investigate. The question asked at the beginning of this chapter: What form of Naskh would one recommend for a book can now be answered not purely on the grounds of beauty and aesthetics and personal preference but also in terms of functional properties that have been scientifically proven.

With regards to linguistics, and there is an educational element to that, the presence of full vocalization brings a cost that outweighs the clarity of meaning. The results showed lower regressions but longer fixation durations for vocalized texts. This is in itself puzzling, and it is hard to ascertain whether this is due to reading habits or to the complexity of including an additional visual layer to be processed in parallel to that of the running text. The added vocals seem to be more of a distraction than an aid. So what can one deduce from that? Typographic norms are as they are. It is an interesting hypothetical exercise, say if one were to educate a group of people to read with fully vocalized text at all times, would that make a big difference in language acquisition and proficiency? Would it make learning Arabic easier? Probably yes.

As mentioned in previous chapters, children go into schools knowing only spoken Arabic, and there they are confronted with Modern Standard Arabic that is practically a second language to them. It is possible that they had heard it in on TV and maybe been read to it in, but it is still new nevertheless. Any extra help to bridge that gap is helpful, and texts for young children are fully vocalized in any case. It would be interesting to see what would happen if children never needed to be weaned off the vocals. Would that make reading Arabic less of a chore?

These are questions for educators and policy makers. Such issues need more research and more participating institutions that support such investigations. One research paper is not enough to bring about serious improvements in the teaching of Arabic. One needs a culture of research and scientific investigation, rather than a reheating of old arguments. Language is as valid as an experimental topic as any other entity. Given
the volatility of politics in the Middle East, and a lack of reading culture, the possible benefits of further research in this domain cannot be clearer or more pressing.

Lastly, one gets to information design. This issue will be discussed separately from aesthetics for the very simple reason: Information design is about the speed of communication through text and graphics. Such areas of visual communication are of course governed by the same aesthetic considerations as any other for of design such as typographic treatment, color, proportion, layout, etc. However, since areas of design are not only governed by how well they look, but also by how well they communicate information, if one were in an airport terminal and rushing to catch a plane, one’s main concern is how to get there as soon as possible. A directional sign that does not serve that purpose fails as a design, no matter how great it looks.

In situations as these, time is a deciding factor. This is no longer about the fluidity of form or authenticity to manuscript forms. This is about the fast communication of relevant information. In such cases, simplified Naskh is the typographic choice to go for. A 3% or 4% increase in the time needed to read a word can be deadly on a highway. Typography, like language, is there to serve a purpose, and in the cases like these, using simplified forms is more a duty rather than an aesthetic choice. It is again an issue of cost: that of losing a flight, or missing an exit. It is also the opportunity of saving lives.

Conclusion

This study sets out to determine the effect of the complexity of word formation on legibility. It is also designed to assess the role the short vowels play in the reading of Arabic texts. This is carried out via a holistic approach to legibility research that combines the visual culture with reading and legibility studies.

To do this it starts by giving a short account of the development of Arabic letterforms used in the setting of long texts and their transition from manuscript to typographic norms. It is a story of an increasing level of maturity and complexity in manuscript forms that initially proved too difficult to morph from handwritten forms to metal-set ones. This introduces the theme of complexity and the role that technology has played in morphing manuscript styles into typographic ones. The first four centuries of printing Arabic comprised an increasing level of complexity in terms of design; that would soon come to halt with the 20th century and the quest for speed, rather than beauty of form. It also establishes how the current state of affairs is one that allows Arabic typography to grow in either or both directions. As such, it sets the stage for the key question regarding the role of complexity of word shaping in the reading of Arabic texts.

The dissertation analyzes the anatomy of the Arabic script, in both manuscript and typographic forms and offers a glimpse of the typographic visual culture of the Arab world today. It also presents the design process of the specially designed Ahlamy typeface family that is representative of the three different typographic interpretations of Naskh. This family is meant to provide the stylistic variable that tests the effect of the complexity of the word formation on legibility, as set out in the research question.

To that, this dissertation also investigates the characteristics of eye movement in reading and the results of legibility studies. It presents a new definition of legibility that is rooted in the models of eye movement research, and argues that legibility is relative and depends on the characteristics of the visual stimulus, the viewer, the distance between them, and the task, and, it has also demonstrates that legibility effects are manifest very early on in word processing. As to the reading of Arabic, it has argued that there are specificity to it that are different from the reading of Latin. To that effect, one needs to address the process of reading from an international perspective, one that takes in the special characteristics of different languages and scripts.

The Findings and Implications

The foremost significant finding to emerge from this study is the affirmation that the increased complexity of word formation has a negative effect on the legibility of Arabic typefaces. This is in line with the view of leading psycholinguists that the complexity of the visual has an extra cost in word processing.
Lastly, this study only examined the reading measures that are time specific but has not analyzed the fixation positions in Arabic, or if the visual complexity has an effect on that. Though the data was collected as part of the same study, the analysis of fixation positions is a laborious process that would have seriously impacted the ability to conclude the study. The analysis of the reading measures already required a complete year to do, and fixation positions would have added another year, thereby significantly delaying the completion of this manuscript. It is planned that this topic would be picked up for further analysis in the near future.

Further Research

As mentioned above, this study leaves many doors open for further exploration. The issue of hemispheric specialization and its role in letter identification is an intriguing one. Is it really true that the right hemisphere cannot distinguish between Arabic letters that are only differentiated by their dots? How does this affect typeface legibility? Is there anything that can be done to compensate for the disadvantage of reading words on the left visual field? And in that vein, how does that disadvantage affect the preview benefit in Arabic? The preview benefit is mainly affected by low level information and letter codes, but if the right hemisphere is unable to process the letters, is there a preview benefit at all?

The most glaring gap, it appears, is in the understanding of the process of reading in Arabic. It is a field in which the design is grossly underresearched and in the large scheme of things, more pressing to investigate than typeface legibility per se. Still, the avenues for Arabic legibility research are very wide open. Of particular relevance are the legibility of road signs and the effects of styles on that. Another topic of interest is the typefaces suited for information design, with a broader look at how Nash and Kufi function within that domain. This is especially the case of low resolution and user interface design.

From the Beginning to the End

This research started with the question of what to design, and how to encourage Arabic to do more. It originally started with a subjective preference for the simplicity of the Kufi styles, and a gut feeling that the complexity of manuscript Nash makes it harder to read. These subjective feelings were soon to be challenged with the design of Alandem. The Dynamic version proved to be a joy to design and to behold, and contained within its curves a beauty and elegance of form that made the Simplified version look very awkward in comparison. The question then turned into one of genuine objectivity. All of the styles available today can blossom into great designs that enrich the typographic repertoire. It was no longer an issue of subjective preference, but of a need to know where and when to use each.

The conviction that complexity is detrimental to reading turned out to be true, but with it came the understanding that there are instances of design where you do want to slow the reader down, where you want the elegance of the letterforms to shine through. This is the paradox, and ultimately the joy, of Arabic typography. The manuscript forms were developed with the specific intention of giving value to
that which is being written, and not for the speed for reading. It is no wonder then that the typographic designs emulating those forms end up bringing that value and sense of worthiness to the text being set.

On the other hand, the simplicity of form that developed to accommodate the speed of type setting also ended up speeding the reading process. When seen in that perspective, the history of Arabic type design no longer seems as one of missed opportunities but rather as a wealth of possibilities. This brings us back to the question of what to design, and a designer’s approach to legibility research. The concept of variables in design, one such example being complexity, is a variable in the full sense of the word. It is an element of design that a designer can control for maximum effect depending on the task at hand.

Still, the question of complexity is a question of reading and context. It is the story of a child faced with learning to read a language that somehow sounds familiar but is nevertheless new. It is the story of a nation-in-waiting. It is the story of a region with a young demographic and a questionable future. Type design is not an easy hurdle for that child to jump. This is, then, not a question of preference of style, but a question of reading as a culture and the benefits that typographic design can bring into the Arab nations.

Epilogue: Reflections on Practice

This section is a short story. Though there are many more questions left that I would like to study, now it is the time to stop, look back, and reflect on this journey. The story begins in 1997, I was 19 and studying at the American University of Beirut, Lebanon. I was not a great graphic designer and during that term, I had seriously considered changing majors. The only reason I stayed was the Arabic typography course. In it, we were introduced to the beauty of Arabic calligraphy and the weight of variation that its styles carried. The course instructor was famed calligrapher and art critic Samir Sayegh. He is a pioneer of the Kufi revival, and in that course, we debated the future of Arabic typography, and what style one were to design in. My love for type design began with a small drawing of the letter Nun, and I was soon set on my career path.

Fast forward to a decade later, and I was the Arabic Specialist at Linotype GmbH in Germany. Though a dream job in many aspects, it was not enough. The question of typeface legibility is one that comes up on a regular basis. The design skills and instincts are there, but the strength of conviction is not enough when one is decreeing that thousands and millions of people are reading in what one believes is better for them. That level of exposure brings with it the weight of responsibility. Technological breakthroughs had completely changed the landscape of Arabic typography. The field of design was suddenly very wide open, and the question of what to design continued to present itself. And so in 2007 I started this research.

It is not often that a typeface designer takes on legibility research. That is very much in the realms of psycholinguistics. Design education does not venture into experimental psychology, nor does it wander into the avenues of statistics, variables, and null hypotheses. In a way, design is a process of trial and error, with time being the final judge. Psychology is a domain more interested in cause and effect, and relationships that can be tested now, rather than in the future. But there is much to learn in the intersection of these two fields: the sensitivity of visual perception meeting with the inquisitive objectivity of the disinterested observer. As designers, we have benefited from color theories of perception, so why not apply the scientific method in order to answer the questions that we grapple with every day?

And so this research began, but as is often the case, the more I read, the less I knew. There is so much more to find out. The reading process comes so naturally to us that it is deceptive in its simplicity. As adults, we have been reading for so many years that we have forgotten how difficult it is to internalize that process. There is much to learn from reading and eye movement research, and it makes all the difference when we sit down to talk about design.

In the final year of this research study, I was discussing with a colleague a typeface that had very narrow word spaces. My first comment came out in design-speak: “The word spaces are too narrow.” This is my designer instinct speaking, but convictions
aside, the persuasion power is not very strong. My second comment was more solid: "Research has shown that when the word space is doubled, reading speed improves, and a clear word space is very important because it helps in the programming of saccades." Knowledge in such a case is more powerful, and infinitely more beneficial than belief.

There have been several highlights in these past five years, two of which are special: the design of Afandem and the experiment in Beirut. The design of the Afandem typeface system was a design challenge unlike any that I had faced before. There was no other Arabic typeface system that I could look to for reference; the Dynamic version was a challenge to draw. That level of elegance and fluidity of motion is difficult to achieve; I have to admit, that prior to Afandem, I was not fond of that style of typefaces. Too conservative, too old, I thought. Afandem changed that. The design of Afandem Dynamic was enchanting and I so loved the design, that it changed my views regarding the benefits of simplicity of design. There is beauty that slaines through, and there is a time and place for different styles of design. In the quest for speed of reading, we should not forget to stop, every once in a while, to appreciate the view.

The experiment in Beirut was another highlight. I am a designer by education and profession, not a psychologist. Designing the experiment set-up and actually going through with it were of a difficulty level beyond any that I had ever encountered. Those weeks in Beirut marked a turning point in me as well; I was suddenly a designer-turned-psychologist.

If being a designer is a state-of-being that colors the way one sees the world, then experimental psychology is a state-of-mind, one that is forever asking, challenging, and testing. I do not doubt that this research has forever changed the way I address design, and I expect that it has also changed the way I live my life.

Summary

This dissertation sets out to determine the effect of the complexity of word formation on the legibility of Arabic texts set in the Naskh style. It is also designed to assess the role the short vowels play in the reading of Arabic texts. This is carried out via a holistic approach to legibility research that combines the visual culture with reading and legibility studies.

To do this it starts by giving a short account of the development of Arabic letterforms used in the setting of long texts and their transition from manuscript to typographic norms. It is a story of an increasing level of maturity and complexity in manuscript forms that initially proved too difficult to morph from handwritten forms to metal-set ones. This introduces the theme of complexity and the role that technology has played in morphing manuscript styles into typographic ones. The first four centuries of printing Arabic comprised an increasing level of complexity in terms of design that would soon come to halt with the 20th century and the quest for speed, rather than beauty of form. It also establishes how the current state of affairs is one that allows Arabic typography to grow in either or both directions. As such, it sets the stage for the key question regarding the role of complexity of word shaping in the reading of Arabic texts.

The dissertation analyzes the anatomy of the Arabic script, in both manuscript and typographic forms and offers a glimpse of the typographic visual culture of the Arab world today. It also presents the design process of the specially designed Afandem typeface family that is representative of the three different typographic interpretations of Naskh. This family is meant to provide the stylistic variable that tests the effect of the complexity of the word formation on legibility, as set out in the research question.

To that, this dissertation also investigates the characteristics of eye movement in reading and the results of legibility studies. It presents a new definition of legibility that is rooted in the models of eye movement research, and argues that legibility is relative and depends on the characteristics of the visual stimulus, the reader, the distance between them, and the reading task itself. It has also demonstrated that legibility effects are manifest very early on in word processing. As to the reading of Arabic, it has argued that there are specifics to it that are different from the reading of Latin. To that effect, one needs to address the process of reading from an international perspective, one that takes in the special characteristics of different languages and scripts.

The foremost significant finding to emerge from this study is the affirmation that the increased complexity of word formation has a negative effect on the legibility of Arabic typefaces. This is in line with the view of leading psycholinguists that the complexity of the visual has an extra cost in word processing. The study has also confirmed the argument that the short vowels are second class citizen within the Arabic alphabet and that their inclusion in text adds a cost to word processing even though they bring with them extra clarity that results in a reduced number of
Summary (Dutch)

Dit proefschrift onderzoekt de invloed van de complexiteit van woordvorming op de leesbaarheid van Arabische teksten gezien in de Nashi-variatie van het schrift. Daarnaast wordt gepoogd vast te stellen welke rol de korte klinkers spelen bij het lezen van Arabische teksten. De methode die daarbij wordt gehanteerd is een holistische benadering van leesbaarheidsonderzoek, die visuele cultuur combineert met lees- en leesbaarheidstests.

Het startpunt van deze studie is een beknopt overzicht van de ontwikkeling van Arabische lettervormen zoals gebruikt bij het schrijven van lange beroepsteksten, en de geleidelijke overgang van handgeschreven naar typografische normen. De kern van dit verhaal is de toenemende rijkheid en complexiteit van de handgeschreven lettervormen, die het aanvankelijk moeilijk, zo niet onmogelijk maakte handgeschreven tekens om te zetten in letterdrukte teksten. Daarmee wordt het thema geïntroduceerd van de complexiteit van het schrift en de rol die de technologie heeft gespeeld bij het omzetten van de verschillende soorten handschrift in typografische equivalenten. De eerste vier eeuwen Arabisch drukken laten een toenemende complexiteit zien in termen van letterontwerp, een ontwikkeling waaraan begin 20e eeuw een einde kwam toen het streven naar vormschoonheid plaats maakte voor het nazagen van snelheid. We kunnen vaststellen dat de huidige stand van zaken de Arabische typografie in staat stelt om in een van deze richtingen verder te groeien - ofwel in beide. Zo wordt het fundamenteel gelegd voor de sleutelvraag: die naar de rol van de complexiteit van woordvorming bij het lezen van Arabische teksten.

De studie analyseert de anatomie van het Arabisch schrift, zowel van handschriftelijke als typografische vormen, en schetst de typografische visuele cultuur van de huidige Arabische wereld. Vervolgens presenteert ze het ontwerpproces van het speciaal voor dit doel ontworpen lettertype Afandem, een letterfamilie die representa-
tief is voor de drie verschillende typografische interpretaties van Nashi. Deze familie is zo ontworpen dat ze de stilistische variabele verschaf waarmee de invloed van de complexiteit van de woordvorming op leesbaarheid, zoals omschreven in de probleemstelling, kan worden getest.

Dit proefschrift beschrijft een reeks tests waarbij de oogbewegingen bij het lezen werden onderzocht, en presenteert de resultaten van de uitgevoerde leesbaarheidsonderzoeken. Hierbij wordt een nieuwe definitie van leesbaarheid gehanteerd: uitgaand van de modellen van oogbewegingsonderzoek wordt gesteld dat leesbaarheid relatief is en afhangt van de karakteristieken van de visuele stimuli, de lezer, de afstand hiertussen en de aard van de leestext. Onderscheidt men de leesbaarheidsresultaten veel vroeg in het tekstverwerkingsproces merkbaar worden. Wat betreft het lezen van Arabisch wordt betoogd dat daarbij specifieke aspecten een rol spelen die anders zijn dan bij Latijns schrift. Daarom moeten we het leesproces benaderen vanuit een internationaal perspectief dat rekening houdt met de specifieke kenmerken van verschillende talen en schriftsystemen.
De belangrijkste conclusie van deze studie is de vaststelling dat grotere complexiteit van de woordvorming een negatief effect heeft op de leesbaarheid van Arabische lettertypes. Dit is in lijn met het standpunt van vooraanstaande psycholinguisten dat grotere visuele complexiteit leidt tot grotere moeite bij het verwerken van tekst. De studie bevestigt daarnaast het standpunt dat de korte klinkers binnen het Arabische alfabet tweederangs hangers zijn, en toont aan dat tekstverwerking moeilijker gaat als die aan de tekst worden toegevoegd, zelfs al brengen ze meer eenduidigheid met zich mee die resulteert in een vermindering van het aantal regressies. Deze resultaten worden besproken in het kader van de Arabische wereld van vandaag en haar culturele en educatieve instellingen. Mogelijke wegen voor verder onderzoek worden vermeld.
من كل الشمكات الثلاث:
زعموا أن أخبروا كان فيه ثلاث مساعدات: كمنة (خيمة الأثرى) وأكرم منها، وإجازة. وكان ذلك الغدير بنجوة من الأرض، لا يكاد يغبيه أحد، ونفاته نهار، فأطلق أن أجاز بذلك. الله صلّى عليه وسلم، فأسرى الغدير، فنحوا أن يملأه إلى السمك، فلم يفرغ مما فيه من السمك، فسمعت الشمكات قولها، أرأيت أنسى، فأعتببت بطهراً، فخرجت من المكان الذي يدخل فيه الماء من النهر إلى الغدير، فنصبت نفسها. وأما الكسية الأخرى، فإنها نهبت في الأماكن حتى جاء الشبان، فأخذها وأدى، وخرجت من حيث دخل الماء، فإنها بحثما قد سأله ذلك المكان ختائتب قالت: مَنْ طغَّى عَلَى هَذِهِ الْهَمَالَةِ الْبَرَاءَةَ، مَنْ عَلَى إِذْهَابِ الْمَاءِ، فَشُفِّيْنَانِ. وَإِذَا أَصبَحَتْ تَحْتُهَا بَصَبَّةٌ، فَوَقَعَتْ عَلَى الأرْضِ يَتْرُشُّ الأَهْلُ الْبَيْنَةَ الْعَلَا، وَنُصِبَتْ أَلْبَاءُ، فَنُصِبَتْ عَلَى النَّهَرِ الْبَيْنَةَ. وَقَالَتْ: يَسْلُكُوا عَلَى نَطْرَةٍ مَّعْلُوَاءٍ.
كل السحابة واللكفين
قالت الأئمة رضوهم: تزعم أن غدير كان برابغًا كبيرًا وكان في الغدير
سحابة تتراوح بين الكفين موكفًا وضاحًا قديمًا. فقال بين أن يخن العجز في الغدير.
فجأت السحابة و訴ك السحابة، وقالوا: للسحابة على السحابة، فإنها دينان عن
هذا السحابة لأجل فضان العجز، فقالت السحابة: إنما يبين في فضان العجز على ملئي.
لكنهم، كافرون، لا يقبلون على العجز إلا بالدماء. فلما ألماء فقوران على العجز حيث كانما.
فقالوا: معتقلاً، فقالوا: ثم، فقالوا: ف취ين السحابة، ونابين السحابة.
تسبين السحابة، ونابين السحابة، ونابين السحابة.

ابن تلمس النافعة، هل كان الرجل يغلي السماء؟
ما إذا زودها في البيت الذي دخل؟
معاك أمثال في ألسنتنا باللغة العربية، بل إنها غير محدودة في الأفكار والفلسفة.

عمام نحن نجد أن التطور في اللغة العربية موجود، ولكن في الوقت نفسه، فإننا نلاحظ أن بعض الأفكار والفلسفة تظل غير محددة.

في النهاية، فإن اللغة العربية لا تزال تتطور وتتطور في النهاية، ولكنها لا تزال تظل غير محددة في الأفكار والفلسفة.

أميغة على الأسئلة الأمثلة، لماذا لم ي/mol المولودة، لماذا لم ي/mol المولودة؟

ما إذا لم ي/mol المولودة، لماذا لم ي/mol المولودة؟
Bibliography


---

Curriculum Vitae

Date of birth: November 11, 1978

Nationality: Lebanese

Education

MA Typeface Design [2003]
United Kingdom, University of Reading, Faculty of Letters and Humanities, Department of Typography and Visual Communication

Bachelor in Graphic Design [2000]
Lebanon, American University of Beirut, Faculty of Engineering and Architecture, Department of Architecture and Design.

Lebanese Baccalaureate II in Mathematical section [1996]
Rawdah High School

Design Practice

Linotype GmbH, Germany [2005-current]
Arabic Specialist, Branding and CI Manager
Major projects:
Typefaces released: Frutiger Arabic, Neue Helvetica Arabic, Univers Next Arabic, Palatino and Palatino Sans Arabic, DIN Next Arabic, and Kufiya.
Typefaces for clients: Sony, An-Nahda newspaper, Al-Izneea, mbc, SKY Arabia, OSN, Porsche, Ministry of Interior (UAE), and Dubai Airports.

Private office and freelance [2000-2004]

Awards and honours

Fast Company’s 100 Most Creative People in Business 2012
Granthan Non-Latin Type Design Award 2012
Award for Excellence in Type Design from Type Directors Club, NY, 2008
Award for Excellence in Type Design from Type Directors Club, NY, 2011
Communication Arts Typography Annual, 2012, two awards
Dean’s Award for Creative Achievement, AUB
Honours In Lebanese Baccalaureate II
Teaching Experience
American University in Dubai [2004]
Lebanese American University [2003]
Lebanese Educational Institute [2001–02]
American Language Center [1999–01]

Stellingen

- The beauty of the Arabic script inhibits its reading.
- In Arabic, guessing is faster than reading.
- Type design is not a magic cure, but it can remove hurdles from the reading process.
- In the quest for speed of reading, we should not forget to stop, every once in a while, to appreciate the view.
- The vertical alignments in Arabic calligraphy reveal hidden musical scales
- Arabic type design is a question of national identity pit[ting traditional roots vs. modernity.
- To be an Arabic type designer is to know very little about reading in Arabic or about the legibility of Arabic typefaces.
- Designers research not only because they want to know, but also because they need to know.
- Arabic type design reveals dichotomy in how the Arab world views itself and how the Western world sees it.
- The real Arab Spring should happen in textbooks and classrooms and not only on the streets.
- The Middle East crisis is not about land, oil, or religion, but a crisis of literacy.

Reading Arabic: Legibility Studies for the Arabic Script
Nadine Chahine