Makor

א לַכֹּל זְמָן וְעֵת לְכָל־חֵפֶץ תַּחַת הַשָּׁמָיִם׃ ב עֵת לָלֶדֶת וְעֵת לָמוּת עֵת לָטַעַת וְעֵת לַעֲקוֹר נָטוּעַ׃ ג עֵת לַהֲרוֹג וְעֵת לִרְפּוֹא עֵת לִפְרוֹץ וְעֵת לִבְנוֹת׃
ד עֵת לִבְכּוֹת וְעֵת לִשְׂחוֹק עֵת סְפוֹד וְעֵת רְקוֹד׃ ה עֵת לְהַשְׁלִיךְ אֲבָנִים וְעֵת כְּנוֹס אֲבָנִים עֵת לַחֲבוֹק וְעֵת לִרְחֹק מֵחַבֵּק׃ ו עֵת לְבַקֵּשׁ וְעֵת לְאַבֵּד
עֵת לִשְׁמוֹר וְעֵת לְהַשְׁלִיךְ׃ ז עֵת לִקְרוֹעַ וְעֵת לִתְפּוֹר עֵת
לַחֲשׁוֹת וְעֵת לְדַבֵּר׃ ח עֵת
וְעֵת שָׁלוֹם׃ ט מַה־יִּתְרוֹן
י רָאִיתִי אֶת־הָעִנְיָן אֲשֶׁר נָתַן
עָשָׂה יָפֶה בְּעִתּוֹ גַּם אֶת־הָעֹלָם
הָעֲשׂוּי אֲשֶׁר־עָשָׂה הָאֱלֹקִים
כִּי אִם־לִשְׂמוֹחַ וְלַעֲשׂוֹת טוֹב
טוֹב בְּכָל־עֲמָלוֹ מַתַּת אֱלֹקִים
הוּא יִהְיֶה לְעוֹלָם עָלָיו אֵין לְהוֹסִיף וּמִמֶּנּוּ אֵין לִגְרֹעַ וְהָאֱלֹקִים עָשָׂה שֶׁיִּרְאוּ מִלְפָנָיו׃ טו מַה־שֶּׁהָיָה כְּבָר הוּא וַאֲשֶׁר לִהְיוֹת כְּבָר
הָיָה וְהָאֱלֹקִים יְבַקֵּשׁ אֶת־נִרְדָּף׃ טז וְעוֹד רָאִיתִי תַּחַת הַשָּׁמֶשׁ מְקוֹם הַמִּשְׁפָּט שָׁמָּה הָרֶשַׁע וּמְקוֹם הַצֶּדֶק שָׁמָּה הָרֶשַׁע׃ יז אָמַרְתִּי אֲנִי בִלְבִּי
אֶת־הַצַּדִּיק וְאֶת הָרָשָׁע יִשְׁפֹּט הָאֱלֹקִים כִּי־עֵת לְכָל־חֵפֶץ וְעַל כָּל־ הַמַּעֲשֶׂה שָׁם׃ יח אָמַרְתִּי אֲנִי בִלְבִּי עַל־דִּבְרַת בְּנֵי הָאָדָם לְבָרָם
הָאֱלֹקִים וְלִרְאוֹת שֶׁהֵם־בְּהֵמָה הֵמָּה לָהֶם׃ יט כִּי מִקְרֶה בְּנֵי־הָאָדָם וּמִקְרֶה הַבְּהֵמָה וּמִקְרֶה אֶחָד לָהֶם כְּמוֹת זֶה כֵּן מוֹת זֶה וְרוּחַ אֶחָד
לַכֹּל וּמוֹתַר הָאָדָם מִן־הַבְּהֵמָה אָיִן כִּי הַכֹּל הָבֶל׃ כ הַכֹּל הוֹלֵךְ אֶל־מָקוֹם אֶחָד הַכֹּל הָיָה מִן־הֶעָפָר וְהַכֹּל שָׁב אֶל־הֶעָפָר׃ כא מִי יוֹדֵעַ רוּחַ בְּנֵי
הָאָדָם הָעֹלָה הִיא לְמָעְלָה וְרוּחַ הַבְּהֵמָה הַיֹּרֶדֶת הִיא לְמַטָּה לָאָרֶץ׃ כב וְרָאִיתִי כִּי אֵין טוֹב מֵאֲשֶׁר יִשְׂמַח הָאָדָם בְּמַעֲשָׂיו כִּי־הוּא חֶלְקוֹ כִּי מִי
יְבִיאֶנּוּ לִרְאוֹת בְּמֶה שֶׁיִּהְיֶה אַחֲרָיו׃

קהלת ג

A System for Typesetting Hebrew with TEX

Version 1.0 February, 2002

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Makor:
A System for Typesetting Hebrew with TEX

Installation and User Guide

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This document provides an initial description of the Makor system for typesetting Hebrew within TEX and LATEX. Before reading any further, please page through these pages and look at the Hebrew typesetting in the examples. *All the Hebrew typesetting in this manual was done with Makor*, although that does not mean those samples were necessarily easy. Anyway, if these examples are irrelevant to you, there's no need to further waste your time.

1 A Plea for assistance

I hope that the Makor software will prove useful to authors who try it out, but of course there is no warranty or guarantee of any kind. The material distributed currently includes special fonts, macros, and this guide. Eventually, I hope to include more fonts, a Perl program for creating Makor fonts, and several enhanced user guides.

In the meantime, Makor is in a state of development, and I need *your* feedback in order to make changes that are features, not bugs. In particular, here's what I need from users like you:

1. any errors or confusing bits in this document;
2. any bugs in the software;
3. any improvements in the input conventions (that is, what you have to type in English to get Hebrew output);
4. places you know to get more fonts (There are lots of free Hebrew fonts on the Web, but essentially all of them are no good. Either the fonts contain ugly letterforms, or the fonts are incomplete. A raw font for Makor must contains all basic characters, all dagesh—dotted—forms, and all vowels); and
5. anything else I might need to Makor better!

2 Features of Makor

With Makor, authors enter Hebrew text using an intuitive keyboard interface. Text can be fully vocalized or not; vowels can be turned on or off with a software switch. These vowels are centered—automatically—for each different letter. Final letterforms are selected automatically. In general, any digital fonts will work with Makor, but it takes considerable tinkering to prepare each font properly. Currently, Makor comes equipped to work with several variants of fonts called Rashi, OmegaSerif (similar to David or David Light), SIL Ezra, and MasterFont Hadassah.

Makor uses the TEX typesetting engine to perform the actual typesetting. It works both with plain TEX and with LATEX; in fact, this document you're reading was produced with LATEX.

וַיָּמָת שָׁם מֹשֶׁה עֶבֶד־יְהוָה בְּאֶרֶץ מוֹאָב עַל־פִּי יְהוָה: וַיִּקְבֹּר אֹתוֹ בַגַּי בְּאֶרֶץ מוֹאָב מוּל בֵּית
פְּעוֹר וְלֹא־יָדַע אִישׁ אֶת־קְבֻרָתוֹ עַד הַיּוֹם הַזֶּה: וּמֹשֶׁה בֶּן־מֵאָה וְעֶשְׂרִים שָׁנָה בְּמֹתוֹ לֹא־כָהֲתָה
עֵינוֹ וְלֹא־נָס לֵחֹה: וַיִּבְכּוּ בְנֵי יִשְׂרָאֵל אֶת־מֹשֶׁה בְּעַרְבֹת מוֹאָב שְׁלֹשִׁים יוֹם וַיִּתְּמוּ יְמֵי בְכִי אֵבֶל
מֹשֶׁה: וִיהוֹשֻׁעַ בִּן־נוּן מָלֵא רוּחַ חָכְמָה כִּי־סָמַךְ מֹשֶׁה אֶת־יָדָיו עָלָיו וַיִּשְׁמְעוּ אֵלָיו בְּנֵי־יִשְׂרָאֵל
וַיַּעֲשׂ כַּאֲשֶׁר צִוָּה יְהוָה אֶת־מֹשֶׁה: וְלֹא־קָם נָבִיא עוֹד בְּיִשְׂרָאֵל כְּמֹשֶׁה אֲשֶׁר יְדָעוֹ יְהוָה פָּנִים
אֶל־פָּנִים: לְכָל־הָאֹתֹת וְהַמּוֹפְתִים אֲשֶׁר שְׁלָחוֹ יְהוָה לַעֲשׂוֹת בְּאֶרֶץ מִצְרַיִם לְפַרְעֹה וּלְכָל־עֲבָדָיו
וּלְכָל־אַרְצוֹ: וּלְכֹל הַיָּד הַחֲזָקָה וּלְכֹל הַמּוֹרָא הַגָּדוֹל אֲשֶׁר עָשָׂה מֹשֶׁה לְעֵינֵי כָּל־יִשְׂרָאֵל:

Figure 1: Fully vocalized Makor output.

2.1 A Word about TEX and LATEX

I don't believe too much knowledge of the TEX or LATEX systems is necessary to read and understand this document. Nevertheless, if you're new to TEX, you need to be aware that this system is fundamentally different from any of the standard publishing/word processing packages you may be used to. It's easy to make TEX do easy things, and challenging to produce more difficult documents. A good short introduction to TEX and LATEX are provided in the appendices to [1], which also lists other sources and resources. On a less costly basis, some the guides such as Michael Doob's `gentle.tex` ("A Gentle Introduction to TEX") and `short.tex` ("A Short Guide to LATEX") are both available from `www.ctan.org`.

3 Goals of the Makor project

1. I wanted to provide a natural input convention which would be close to what Americans might expect to type to get Hebrew text. For example, it has become common to represent the throat-clearing gutteral sound present in Hebrew (but not in English) by 'ch'. In Makor you type 'ch' to get ח, its Hebrew equivalent. In a similar way, I expect TEX to take care of the tedious details of deciding when to typeset final forms of certain letters.

   Americans often type '`chanukah` to get the name of the Jewish holiday חַנוּכָּה; in Makor, we type `chanookauh`.

2. I want to typeset vowels—which you can think of as diacritical marks—

מסורת הש״ס

ארבעה

אֲבוֹת נְזִיקִין, הַשּׁוֹר וְהַבּוֹר וְהַמַּבְעֶה וְהַהֶבְעֵר. לֹא הֲרֵי הַשּׁוֹר כַּהֲרֵי הַמַּבְעֶה, וְלֹא הֲרֵי הַמַּבְעֶה כַּהֲרֵי הַשּׁוֹר, וְלֹא זֶה וָזֶה שֶׁיֵּשׁ בָּהֶן רוּחַ חַיִּים, כַּהֲרֵי הָאֵשׁ שֶׁאֵין בּוֹ רוּחַ חַיִּים, וְלֹא זֶה וָזֶה שֶׁדַּרְכָּן לֵילֵךְ וּלְהַזִּיק. הַצַּד הַשָּׁוֶה שֶׁבָּהֶן שֶׁדַּרְכָּן לְהַזִּיק וּשְׁמִירָתָן עָלֶיךָ, וּכְשֶׁהִזִּיק חָב הַמַּזִּיק לְשַׁלֵּם תַּשְׁלוּמֵי נֶזֶק בְּמֵיטַב הָאָרֶץ: גמ׳ מדקתני אבות מכלל דאכא תולדות.

ארבעה **אבות נזיקין**-אבות קרי להנך דכתיבן בקרא בהדיא. ובגמרא מפרש הי ניהו תולדות: **השור והבור כו׳**-כסדר שהן כתובין בפרשה סדרן במשנה. דפרשה ראשונה נאמרה בשור שניה בבור: **מבעה**-מפרש בגמ׳: **הבער**- כי תצא אש: **לא הרי השור כהרי המבעה**-כלומר אי כתב רחמנא לא נפק מבעה מיניה ואמטו להכי איצטרכו למיכתב והכי נקט ברישא כהרי המבעה ולא נקט להו כסדר לא הרי השור כהרי הבור משום דתו לא הוי מצי למיתני לא זה וזה שיש בהן רוח חיים ועוד טעמא אחרינא דהא רבותא אשמעינן שאע״ג שיש לשניהם רוח חיים לא נפיק חד מחבריה ובגמ׳ מפרש מאי לא הרי דקאמר: **כהרי האש שאין בו רוח חיים**-ואי לא תתביה רחמנה הוא חמינא ליפטר: **לא זה וזה כו׳**-אלו שלשתן דרכן לילך ולהזיק: **הצד השוה כו׳**-מפרש בגמ׳ לאתויי מאי: **במיטב הארץ**-מעידת נכסיו יגבה דמי הזקו אם רוצה לפרוע לא קרקע: **גמ׳** **סטאת**- בשוגג: **סקילה**- במזיד: **אי עביד שתי אבות**-בשוגג: **מיחייב**- תרתי חטאות: **לא מיחייב אלא חדא**-אאב מלאכה אבל אתולדה דידיה לא מיחייב: **ולר״א דמחייב תרתי כו׳**- דאי עביד אב ותולדה דידיה מחייב תרתי חטאות במס׳ כריתות בפ׳ אמרו לו (דף טז.) כולהו אבות מלאכות ממשכן גמרינן להו במסכת שבת (דף מט:) :

שקלים ח.

כריתות ג:

ארבעה **אבות נזיקין**-אית דוכתא דלא תני הן כמו הכא ובגמרא גבי שלש עשרה אבות נזיקין ובארבעה מחוסרי כפרה (כריתות דף ח:) ואית דוכתא דקתני הן כדקתני ארבעה שומרין הן (שבועות ד׳ מט.) וארבעה ראשי שנים הן (ר״ה ד׳ ב.ושם) :(גליון.וא״ת אמאי לא קאמר ארבעה אבות נזיקין הן כדקתני ד׳ ראשי שנים הן וי״ל שלא בא אלא להגיד ארבעה אבות הללו לאי זה תראי זה וקלת קשה דבגמרא מוכח דנכית תנא למניינא מדפריך ותנא דידן מאי טעמא לא תני הני לכך י״ל דיש מקומות דלא תני הן כדאשכחן בארבעה מחוסרי כפרה״. ע״ה) :

השור והבור-פירוש בקונטרס כסדר שנכתבו בפרשה סדרן במשנה ואף על גב דלמ״ד תנא שור לרגלו לא הוי כסדר הפרשה דרגל נפקא לן מושלא את בעירה דכתיב בתר בור מ״מ שם שור כתיב קודם בפרשה דהיינו נגיחה דקרן ולמ״ד מבעה זה אדם אע״ג דלבתר הבערה כתיב בפרשת אמור מכה בהמה אשלמנה דהיינו אדם דאזיק שור לא חש לשנותו כסדר הפרשה לפי שרחוק כל כך ושנאו כסדר לא הרי דסיפא שמבעה קודם להבער :

לא הרי השור כרי המבעה. פירוש אין קולתו של שור כקולתו של ממבעה כדמפרש לקמן בגמ׳ למ״ד תנא שור לקרנו ומבעה לשינו משום דשור כוונתו להזיק ומבעה אין כוונתו להזיק ולפיכך אי כתב רחמנא שור לא אתי מבעה מינה שהוא קל מינה ואין פירושו כשאר מקומות שבתלמוד לא ראי זה דהתם פירושו אין חומרא של סה כחומרא של זה ולכך אין החומרות גורמות זה הדין אלא הצד השוה שבהן גורם הדין הדין ושינה כאן התלמוד פירושו מבשאר מקומות משום דהזכיר החמור תחילה בלא זה וזה שיש בהן רוח חיים:

ולא זה וזה שיש בהן רוח חיים כהרי האש. גבי שור ומבעה לא הוצרך לפרש החומרא כי הכא משום דחד מחד קל למצוא חומר באחד מה שאין בחבירו והא דלא תני הכא לא הרי האש כרי השור ומבעה כדקתני לעיל לא הרי המבעה כרי השור משום שלא היה יכול למצוא חומרא מה שאין בשניהם דאי משום דכח אחר מעורב בו ואין הולך לדעתו כמו שורו אין זה חומרא מדלא חשיב לה גבי חומר בהס מבשור והא דאמירן לקמן (דף ג:ודף ו.) גבי אבנו וסכינו מאי שנא אש דחך אחר מעורב בו ואין הולך לדעתו ה״ק מאי שנא אש שאע״ף שכח אחר מעורב בו ראוי להתחייב בו משום שהוא ממונך ושמירתו כו׳ ובסיפא גבי בור הוה מצי למימר לא הרי הבור שתחילת עשייתו לנזק

Figure 2: Some more elaborate typesetting—a page from the Babylonian Talmud.

properly. In English, all diacritics are centered on their base letter. In Hebrew, all diacritics are centered with respect to a visual axis of symmetry, which is different for each letter. Makor respects this change of axis for each letter.

3. It's natural, when reading Hebrew, to read each letter (all the letters are consonants) and then apply the vocalization specified by each vowel. As a result, this implies typing in vowellized Hebrew *contrary* to usual TEX conventions—in Makor input, the base letter precedes the vowel, rather than follows it as is normal in TEX. Moreover, since there are so many vowels in a word, I again seek a more natural input language, one uncluttered by backslashes and group symbols.

Even if you are not interested in Hebrew *per se*, you may find this project of interest. For it is an example of adapting TEX to work with a non-Latin writing system. I hope this example is useful for others who wish to use TEX for non-Latin writing systems. Moreover, Makor is a good example of the use of virtual fonts; all of the Makor fonts are heavily "virtualized."

Incidentally, I am optimistic that by virtue—the considerable virtue—of virtual fonts, it would be straightforward to adapt Makor input conventions for other language users. Italian authors, for example, may have other conventions for entering Hebrew, and an Italian 'dialect' of Makor could accommodate these. In particular, I look forward to adapting makor to Hebrew keyboards to—presumably—make this software of use to Israeli authors.

4 Getting and installing Makor

4.1 Getting the software

The current version of Makor can always be found in the CTAN archives. Search for a directory named '`makor`', and there you are. This manual, called `makorman`, is present in several forms—as a `.tex` file, as a `.dvi` file, and as a `.pdf` file.

I encourage all potential users and authors to browse `makorman.pdf` to see if the package does what you want. *All* the Hebrew samples in this document are a product of Makor.

חֲגִגִית הָאֵרוּסִין שֶׁל חַיּוּתָה

סביון ליברכט

אֶת חֲגִיגַת הָאֵרוּסִין° שֶׁל חַיּוּתָה קָבְעוּ בְּמְהִירוּת, אַחֲרֵי שֶׁהַצְּעִירִים הוֹדִיעוּ עַל כָּךְ פִּתְאוֹם לַהוֹרִים.

°ENGAGEMENT **ארוסין**

חֲמִישָׁה־עָשָׂר יָמִים לִפְנֵי הַחֲגִיגָה, עֲדַיִן לֹא חָשַׁב אִישׁ עַל הַבּוּשָׁה° שֶׁעָלוּל• סַבָּה מֻנְדָּל לְהָבִיא עַל כּוּלָם.

°SHAME **בושה**

•LIABLE **עלול**

כּוּלָם הָיוּ עֲסוּקִים: עָרְכוּ רְשִׁימוֹת• שֶׁל הָאוֹרְחִים, הַמַּאֲכָלִים, הַכֵּלִים שֶׁיֵּשׁ לְהָכִין, הַשְּׂכֵנִים שֶׁמּוּכָנִים לַעֲזוֹר, הַמָּתָנוֹת שֶׁחַיּוּתָה מְבַקֶּשֶׁת לְקַבֵּל.

°BUSY **עסוק**

•LIST **רשימה**

בֶּלָה, אִמָּהּ שֶׁל חַיּוּתָה, הִבִּיטָה בַּבַּיִת וְנִבְהֲלָה°.

°BE FRIGHTENED **נבהל**

הַכְתָמִים° עַל בַּדֵּי הָרִפּוּד• נִרְאוּ לָהּ קוֹפְצִים לָעַיִן, הַוִילוֹנוֹת כְּבָר יְשָׁנִים, עַל נְיַר הַקִּיר בַּחֲדַר הָאוֹכֶל רוֹאִים אֶת הַסִּימָנִים שֶׁל הַכִּסְאוֹת.

°STAIN **כתם**

•UPHOLSTERY **בדי רפוד**

וְכָךְ נוֹסְפָה גַּם רְשִׁימָה שֶׁל חֲנוּיוֹת לְבַדֵּי רִפּוּד וּלְבַעֲלֵי־מִקְצוֹעַ°.

°PROFESSIONAL **בעל־מקצוע**

בְּתוֹךְ כָּל הָרַעַשׁ נִזְכְּרָה בֶּלָה שֶׁהִיא עֲדַיִן לֹא הֶחְלִיטָה אֵיזוֹ שִׂמְלָה תָּכִין לְעַצְמָהּ לַחֲגִיגָה.

Figure 3: Typesetting a hypothetical Hebrew primer. Here, we define words at the margin, as would be appropriate in a book for beginning language students.

4.2 Installing Makor

Do these things to get your version of TEX Makor-ready. By the way, when we say 'TEX', we mean current version of *extended* versions of TEX, which you'll need for the right-to-left typesetting part. Common such versions are Omega, Lambda, eTEX, eLATEX, pdfeTEX, and pdf-eLATEX, all available from your neighborhood CTAN archive, among other sources. *Make sure* they adhere to Karl Berry's font naming convention (usually not a problem).

Remember, any time you add new files to your TEX system, you'll need to update the file name database!

It's best to get the Makor software in a `.zip` file from CTAN (online documentation there will show you how to do this). Then, in the root of your local `texmf` directory, unzip the software with the command

```
unzip -d makor
```

(assuming the zip file is `makor.zip`). Next, place the contents of the file `makor.map` into your font map file, usually named `psfonts.map`. Finally, you'll need to do a few things by hand to get the fonts ready.

4.2.1 Fonts: OmegaSerifHebrew

The font OmegaSerifHebrew is distributed with Omega, one of your possible choices for an extended version of TEX you'll need for Makor. On many (most?) implementations of TEX, Omega will automatically be installed.

Take copies of the `.pfb` and `.tfm` files, and rename them `omsehe.pfb` and `omsehe.tfm`. Place them in directories like

```
<texmf>/fonts/type1/makor/osh
<texmf>/fonts/tfm/makor/osh
```

The Omega fonts themselves are in directories like

```
<texmf>/fonts/type1/public/omega
```

and

```
<texmf>/fonts/tfm/public/omega
```

4.2.2 Fonts: Hadassah

The Hadassah fonts I used are sold by MasterFont Studio Rosenberg, an Israeli digital type foundry (159 Yigal Alon St., Tel Aviv 67443, Israel; סטודיו רוזנברג, רח׳ יגאל אלון 159, תל אביב 67443, ישראל). Upon receipt of your credit card order, they will email you zipped TrueType font files. Here's what to do when you get them:

1. Follow the directions in the Appendix to this document to generate fonts that TEX can cope with.

2. Place all the font files in a directory like

   ```
   <texmf>/fonts/truetype/rosenberg/hadassah
   ```

3. Place the `.tfm` and `.vf` files in

   ```
   <texmf>/fonts/tfm/makor/hadas
   <texmf>/fonts/vf/makor/hadas
   ```

For the umpteenth time, don't forget to refresh the TEX filename database. (I'm always forgetting to do it—that's why I emphasize it!)

4.2.3 Miscellaneous files

Most of the remaining miscellaneous files have uses, perhaps esoteric, as described elsewhere in this manual. Of course, several of the miscellaneous files are used to generate this manual. There should be several `.eps` and `.pdf` files, the file `makorman.tex`, and the file `makorman.pdf`, which is what you've read.

(Here, `<texmf>` refers to the head of the TEX-MF tree. It often has a value of `c:\texmf` or `/usr/local/texmf` in personal computer systems.)

That's it! You're now ready to produce masterpieces of Hebrew typesetting.

4.3 Testing the installation

If you've completed the installation process, not forgetting to update the TEX filename database, then you're ready to test the system. Enter a work directory, and type any of the three following commands:

```
etex refcard
omega refcard
pdftex refcard
```

If you've typed '`pdftex refcard`', you're ready to preview the resultant file, called `refcard.pdf` with Adobe Acrobat Reader or with Ghostscript.

If you've typed any of the first two commands, either of which produce the file `refcard.dvi`, you'll need to post-process this file with either of the following two commands:

```
dvips refcard
dvipdfm refcard
```

The output, either `refcard.ps` or `refcard.pdf`, can be viewed now with either of Acrobat Reader or `Ghostscript`.

You will **not** be able to process this file, the Makor documentation, unless you have installed the Hadassah fonts. These fonts are called at numerous places but if you comment out the

```
\IHaveHadassahFontstrue
```

statement at the beginning of this document, it should compile, although without Hadassah, some parts will look funky.

5 Preparing your document for Makor

In plain TEX documents, include the statement

```
\input makor
```

at the beginning. In LATEX, include the statement

```
\usepackage{makor}
```

right after the `\documentclass{...}` command.

5.1 Makor's Hebrew environment commands

The 'delimiters' `\[` and `\]` delimit all your Hebrew text; text outside these commands is set in English. Text within these brackets is set in Hebrew according to the conventions we describe below. (If you're using Makor with LaTeX, use the `displaymath` environment for displayed math instead of `\[` and `\]`.)

If you are typing a paper that's all Hebrew, you must terminate each paragraph with `\]` and re-commence Hebrew again at the beginning of the following paragraph with `\[`. I don't know why this is so; it appears to be a requirement of both eTeX and of Omega.

5.2 Selecting Hebrew fonts

In either case, you need to specify which fonts to use. **Do not use font selection commands other than the ones that are part of the Makor package.** For either TeX or LaTeX, type

```
\hfontdef{HEB}{ohebrmm}{10pt}
```

which associates a 10pt-version of font `ohebrmm` with the name `HEB`. Once you define, one way to invoke it is

```
\[\hfont{HEB}...\]
```

You often find yourself going in and out of Makor's Hebrew environment, and it quickly becomes a nuisance to keep specifying the same old Hebrew font using `\hfont`. You can eliminate this problem by appealing to Makor's sense of a default font. The first font defined always becomes the default font, which is why it's important to define at least one font before you start typesetting Hebrew. In addition, you can explicitly set the default Hebrew font by means of

```
\declarehdefault{HEBX}
```

assuming `\hfontdef{HEBX}{...}` appeared before this definition.

To repeat, **you must define at least one Hebrew font before you use `\[` and `\]` for the first time.** That's because Makor will use the first-defined Hebrew font as the default. The absence of any defined fonts will badly confuse the default-font mechanism.

OmegaSerifHebrew fonts

לָכֵן חַכּוּ־לִי נְאֻם־יְדוד לְיוֹם קוּמִי לָעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְּאֵשׁ קִנְאָתִי תֵּאָכֵל כָּל־הָאָרֶץ׃ [צפניה ג׃ח]

SIL Ezra fonts

Regular: לָכֵן חַכּוּ־לִי נְאֻם־יְדוד לְיוֹם קוּמִי לָעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְּאֵשׁ קִנְאָתִי תֵּאָכֵל כָּל־הָאָרֶץ׃ [צפניה ג׃ח]

Italic: *לָכֵן חַכּוּ־לִי נְאֻם־יְדוד לְיוֹם קוּמִי לָעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְּאֵשׁ קִנְאָתִי תֵּאָכֵל כָּל־הָאָרֶץ׃ [צפניה ג׃ח]*

Bold: **לָכֵן חַכּוּ־לִי נְאֻם־יְדוד לְיוֹם קוּמִי לָעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְּאֵשׁ קִנְאָתִי תֵּאָכֵל כָּל־הָאָרֶץ׃ [צפניה ג׃ח]**

Bold italic: ***לָכֵן חַכּוּ־לִי נְאֻם־יְדוד לְיוֹם קוּמִי לָעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְּאֵשׁ קִנְאָתִי תֵּאָכֵל כָּל־הָאָרֶץ׃ [צפניה ג׃ח]***

Outline: לָכֵן חַכּוּ־לִי נְאֻם־יְדוד לְיוֹם קוּמִי לָעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְּאֵשׁ קִנְאָתִי תֵּאָכֵל כָּל־הָאָרֶץ׃ [צפניה ג׃ח]

Rashi fonts

Regular: לָכֵן חַכּוּ-לִי נְאֻם-יְדוד לְיוֹם קוּמִי לָעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְּאֵשׁ קִנְאָתִי תֵּאָכֵל כָּל-הָאָרֶץ׃ [צפניה ג׃ח]

Bold: **לָכֵן חַכּוּ-לִי נְאֻם-יְדוד לְיוֹם קוּמִי לָעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְּאֵשׁ קִנְאָתִי תֵּאָכֵל כָּל-הָאָרֶץ׃ [צפניה ג׃ח]**

Hadassah fonts (MasterFont Rosenberg)

Regular: לָכֵן חַכּוּ־לִי נְאֻם־יְדוד לְיוֹם קוּמִי לָעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְּאֵשׁ קִנְאָתִי תֵּאָכֵל כָּל־הָאָרֶץ׃ [צפניה ג׃ח]

Italic: *לָכֵן חַכּוּ-לִי נְאֻם-יְדוד לְיוֹם קוּמִי לָעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְּאֵשׁ קִנְאָתִי תֵּאָכֵל כָּל-הָאָרֶץ׃ [צפניה ג׃ח]*

Bold: **לָכֵן חַכּוּ־לִי נְאֻם־יְדוד לְיוֹם קוּמִי לָעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְּאֵשׁ קִנְאָתִי תֵּאָכֵל כָּל־הָאָרֶץ׃ [צפניה ג׃ח]**

Bold italic: ***לָכֵן חַכּוּ-לִי נְאֻם-יְדוד לְיוֹם קוּמִי לָעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְּאֵשׁ קִנְאָתִי תֵּאָכֵל כָּל-הָאָרֶץ׃ [צפניה ג׃ח]***

Figure 4: Available Hebrew fonts in Makor

6 Fonts

I am grateful for the high quality fonts that I have been able to adapt to Makor, in particular the beautiful OmegaSerifHebrew rendered by Yannis Haralambous and the exquisite Ezra fonts, graciously placed in the public domain by the Summer Institute of Linguistics (sometimes called SILEzra). The wonderful Hadassah fonts prove that commercial fonts can be adapted to Makor.

Several different fonts, drawn from a small number of font families, can currently be used with Makor. Since these fonts need considerable tweaking, you won't be able to use your own Hebrew fonts with this package. Figure 4 shows the current selection. Figure 7 gives the Makor names for these fonts.

Note that these fonts have been called at different design sizes in order to appear roughly equivalent in size. The OmegaSerifHebrew and Ezra fonts are in design size 10.0pt, while the Rashi fonts appear in size 8 pt, and the Hadassah fonts are 11 pt.

Incidentally, many raw Hebrew fonts contain only the basic glyphs of the Hebrew alphabet and associated special symbol, but often lack punctuation, numerals, and other special symbols. Makor fleshes these raw fonts with glyphs taken from the Computer Modern Fibonacci font, `cmfib8`, because of all the CM fonts, glyphs from this font best match with Hebrew glyphs, and because I've always looked for a good use for this fascinating font.

6.1 Special note on the Hadassah fonts

All the fonts but Hadassah are in the public domain, and we should be grateful that such handsome fonts are present for us to use. The Hadassah fonts are not. These beautiful fonts are furnished by an Israeli digital font foundy, Masterfont Rosenberg (`www.masterfont.co.il`). You have to **buy** these fonts in order to use them. They are TrueType fonts, with an unusual layout, and they had to be massaged by the `ttf-edit` program available from TrueType (`www.truetype.com`); see the Appendix to this document for details. If you buy these fonts, you'll need this information to make Hadassah usable with Makor.

6.2 Compiling the source file

After you've completed the source file according to the rules described below, you *must* run it through either the extended TEX `etex` or its LATEX counterpart `elatex`. That is, type something like

```
omega myfile
```

or

```
elatex myfile
```

to produce the `.dvi` that you then work with in the usual way, to preview, print, or convert to PostScript or `.pdf`.

6.2.1 Note on dvips

Well, almost the usual way. I could not get `dvips` (version 5.86) to work properly with TrueType fonts. It's quite likely that this version is sufficiently out-of-date to explain this non-performance, but I simply switched from this program to `dvipdfm` (version 0.13.2), which worked flawlessly. This program should be part of your TEX suite.

7 Input conventions

7.1 Entering Hebrew consonants

I've tried very hard to make the correspondance between the letters of the Latin keyboard and their Hebrew typeset equivalents be as natural as possible, at least for American typists. Here is the main principal: you get a consonant by typing an English consonant. The left apostrophe `‘`, the right apostrophe `’`, the asterisk `*`, the circumflex `^`, and maybe a few other characters also have special significance.

If you type `b`, you get בּ. If you type `v`, you get ב, and so on. If you type `ch` or or `ts` you get ח or צ. TEX is careful to use the final forms of letters where appropriate, so all you need do is type `mym` to get מים. You get aleph, the soundless consonant א, by typing `‘`. The almost soundless letter ayin, ע, you get by typing `‘‘`; Makor treats it as a ligature.

GENESIS I

1 *In the beginning of God's creating the heavens and the earth—*
2 *when the earth was bewilderment and void, with darkness over the surface of the deep, and the breath of God was hovering upon the sur-*
3 *face of the waters—God said, "Let there be light," and there was light. God saw that the light was good,*
4 *and God separated between the light and the darkness. God called*
5 *the light: "Day," and to the darkness He called: "Night." And there was evening and there was morning, one day.*

בראשית א

בְּרֵאשִׁית בָּרָא אֱלֹקִים אֵת
ב הַשָּׁמַיִם וְאֵת הָאָרֶץ׃ וְהָאָרֶץ
הָיְתָה תֹהוּ וָבֹהוּ וְחֹשֶׁךְ עַל־
פְּנֵי תְהוֹם וְרוּחַ אֱלֹקִים מְרַחֶפֶת
ג עַל־פְּנֵי הַמָּיִם׃ וַיֹּאמֶר אֱלֹקִים
ד יְהִי־אוֹר וַיְהִי־אוֹר׃ וַיַּרְא אֱלֹקִים
אֶת־הָאוֹר כִּי־טוֹב וַיַּבְדֵּל אֱלֹקִים
ה בֵּין הָאוֹר וּבֵין הַחֹשֶׁךְ׃ וַיִּקְרָא
אֱלֹקִים לָאוֹר יוֹם וְלַחֹשֶׁךְ קָרָא לָיְלָה
וַיְהִי־עֶרֶב וַיְהִי־בֹקֶר יוֹם אֶחָד׃

Figure 5: A portion of Genesis. The verse numbering for both the Hebrew and English selections were done automatically.

It's impossible to allocate all English consonants to the Hebrew consonants in a meaningful manner, so we use the circumflex to help us out at times. In modern Hebrew, there are several letters that are all pronounced like our 's'. In Makor, we distinguish be the presence of additional input marks.

For example, you get one s-sound, the samekh ס, by typing `s`. To get the saf ת, you need to enter `s^`; the `^` serves as an input modifier. Finally, to get the sin שׂ, you type `^s`; here the left position of the circumflex should suggest the left appearance of the dot. In the same way, you get ט if you type `t`, but you get ת if you type `t^`.

For all consonants you get its dotted form by following it with an `*`. Thus, although `h` and `sh^` yield ה and שׁ, `h*` and `sh^*` yield ה and שׁ. To get שׁ, type `sh^*`, but *not* `sh*^`.

In addition, many of the dotted forms can be gotten by typing English capital letters, although I deprecate this use because this rule is not universal.

Although TEX is smart enough to automatically select the end-of-word consonants by itself, you can force such a consonant by appending the circumflex to the letter. The word ולפוסח, which appears in one of the Dead Sea Scrolls (at least this is the way it looks to me), is keyed in as `wlfwm^ch`. Incidentally, you can *suppress* the final form by typing the command `\NOBOUNDARY`. For example, if I type `\[ts\]`, I get ץ. To get צ, I type `\[ts\NOBOUNDARY\]`.

Please refer to Table 1 for the full list of English-Hebrew typing conventions for consonants.

7.2 Hebrew vowels

The English vowels together with the symbols `+`, `:`, `"`, and `|` are sometimes used to get vowels. To get a vowel, you type either one or two characters, and there may be more than one way to get a vowel. Except for some special cases detailed below, each vowel follows its base letter. Thus to get בַ, type `ba`, and so on.

Table 2 displays the Makor typing conventions for vowels.

Some comments: We get ◌ַ by typing `+`, because the plus sign sorta' kinda' looks like the ◌ַ. But we can also get it by typing `au`, since the 'au' sign as in the word 'aura' mirrors the sound of the kamatz ◌ָ, at least in Ashkenazic (European) pronunciations. Where possible, I have provided several alternative input mechanisms, because certain inputs may look better in different contexts: `b'nei yi^srau'ael`⇒בְּנֵי יִשְׂרָאֵל.

We get the *chataf* vowels ◌ֲ ◌ֳ ◌ֱ by preceding each vowel with a colon. We

To get:	*Type...*	*To get:*	*Type...*
א	‘		
ב	v	בּ	b, v*
ג	g	גּ	g*, G
ד	d	דּ	d*, D
ה	h	הּ	h*, H
ו	w	וּ	w*, W
ז	z	זּ	z*, Z
ח	ch, x		
ט	t	טּ	t*, T
י	y	יּ	y*, Y
כ	kh, K	כּ	k, kh*
ך	kh at EOW, kh^	ךּ	k at EOW, k^
ל	l	לּ	l*, L
מ	m	מּ	m*, M
ם	m at EOW, m^		
נ	n	נּ	n*, N
ן	n at EOW, n^		
ס	s	סּ	s*, S
ע	‘‘		
פ	f	פּ	p, f*
ף	f at EOW, f^		
צ	ts	צּ	ts*
ץ	ts at EOW, ts^		
ק	q	קּ	q*, Q
ר	r	רּ	r*, R
ש	sh	שּ	sh
שׁ	sh^	שּׁ	sh^*
שׂ	^s	שּׂ	^s*

Table 1: Makor transcription rules for Hebrew consonants (EOW=end of word boundary). There is often more than one way of getting a particular consonant.

To get:	*Type...*	*To get:*	*Type...*
	’		
	e		:e
	au, +		:+
	a		:a
	ae, ei		
	i		
	u		
	oo, w*		
	o		
	O		
	|		|a
	|+		|e
	|i		|"
	|’		

Table 2: Makor conventions for vowels.

cannot type `:au` because this would result in a three character sequence. Vowel sequences cannot be longer than two characters.

The *messeg* ֿ has a certain purpose in grammar, and you often see this vowel in combination with other vowels. You get these vowels by preceding the vowel with the vertical bar: `|` gives ֿ, `|+` gives ֿ, and so on.

Certain gutterals that end a word and take a vowel are pronounced as if the vowel precedes the consonant. Thus, although we could type `roocha` to get רוּחַ, this looks funny, since the Hebrew word is pronounced *roo-ach*. Makor provides a transposition symbol for instances like this so that the input mirrors the pronunciation. This transposition character is the underscore, so we get רוּחַ by typing `roo_ach`. You can also use this to get the verb יוֹדֵעַ; that is, type

```
yOdae_a‘‘
```

Each vowel follows its base letter. So we get מַיִם by typing `mayim`. You get רַבִּנוֹבִיץ׳ by typing `rabinOviyts‘`; here we've used the fact that certain foreign sounds (foreign from the Israeli point of view, that is) are indicated by a right quote, which we also get via `\’`.

Sivan Toledo [2] suggests several words difficult for Hebrew typesetting systems. They are

יִדְרשֹׁן שֹׂנֵא וְלַשֹּׁרֵקָה מַצּוֹת מִצְוֹת

which you get by typing

```
yid’rosh^oon ^sonae‘ w’la^s*oraeqauh mats*Os^ mits’wos^
```

For a more extended example, note that the selection of figure 1 is the product of

```
way*aumaus^ sh^aum mosh^eh  ‘‘eved-\TETRAGRAMMATON\
b’‘erets mO‘aud‘‘al-piy \TETRAGRAMMATON\COLON\
way*iq’bor ‘o{}s^O vag*ay b’‘erets mO‘auv
mool baeys^ p’‘‘Or w’lo‘-yauda‘‘ ‘iysh^ ‘es^-q’vuraus^O
‘‘ad hay*Om haz*eh\COLON\
oomosh^eh ben-mae‘auh w’‘‘e^s’riym sh^aunauh b’mo{}s^O
l’‘-khauh:as^auh ‘‘aeynO w’lo‘-naus laech|oh\COLON\
way*iv’koo v’naey yi^s’rau‘ael ‘es^-mosh^eh b’‘‘ar’vo{}s^
mO‘auv sh^’losh^iym yOm way*it^’moo
y’maey v’khiy ‘aevel mosh^|eh\COLON\
w|iyhOsh^u_a‘‘ bin-noon maulae‘ roo_ach chaukh’mauh
k|iy-saumakh^’ mosh^eh ‘es^-yaudauyw ‘‘aulauyw
way*ish^’m’‘‘oo ‘aelauyw b’n|"y-yi^s’rau‘ael
way*|a‘‘:a^soo k|a‘:ash^er tsiw*auh \TETRAGRAMMATON\
```

```
‘es^-mosh^|eh\COLON\
w’lo‘-qaum nauviy‘ ‘‘Od b’yi^s’rau‘ael k’mosh^eh
‘:ash^er y’dau‘‘O \TETRAGRAMMATON\ pauniym ‘el-pauniym\COLON\
l’khaul-hau‘o{}s^o{}s^ w’ham*|Of’s^iym ‘|ash^er sh^’lauchO
\TETRAGRAMMATON\ l|a‘‘:a^sOs^ b’‘erets mits’rauyim l’far’‘‘oh
ool’khaul-‘‘:avaudauyw ool’khaul-‘ar’ts|O\COLON\
ool’khol hay*aud h|ach:azauqauh ool’khol ham*Orau‘
hagaudOl ‘:ash^er ‘‘au^sauh mosh^eh l’‘‘aenaey
kaul-yi^s’rau‘|"l\COLON
```

7.2.1 Special considerations for חולם (cholem)

The cholem vowel has two representations—וֹ and “cholem lite” אֹ (חוֹלֶם חָסֵר?), also called a defective cholem. There is nothing special to say about the former, but certain typographic conventions have been built in to the latter in Makor fonts.

No dot should be used when the cholem lite comes after שׁ or before שׁ. Hence: `^sonae‘` yields שֹׁנֵא. Similarly,

```
^sonae‘ n’^so‘ mosh^eh yir’po^s han*|o^s’‘iym
```

typesets as שֹׁנֵא נִשְׂא מֹשֶׁה יִרְפֹּשׁ הַנִּשְׂאִים. But `sh^omaer` gives שֹׁמֵר. Makor achieves these effects using TEX’s ligature mechanism, so if you prefer the ungainly מֹשֶׁה, you get it via `mo{}sh^eh`. But—and note this well—if a defective cholem precedes a ת, you will need to break the ligature. Thus, we would need to type `‘o{}s^O` to get אֹתוֹ (otherwise you get the malformed אסֹהוֹ). See below, in subsection 7.4.2, for a discussion of “ligature breaking” and what that entails.

Some shenanigans pertain to the cholem dot in connection with the aleph. When this dot precedes א which functions as a vowel, then the dot should appear over the right arm of the aleph. So we get בֹּא רֹאשׁ from `bo‘ ro‘sh^`. But we need to type `bo{}‘aum` to get בֹּאָם; here, the א begins a syllable and functions therefore as a consonant. The `{}` fractures the ligature so we get the proper effect.

These conventions are part of all Makor fonts, and so you get

שֹׁנֵא נִשְׂא מֹשֶׁה יִרְפֹּשׁ הַנִּשְׂאִים בֹּא רֹאשׁ בֹּאָם

in OmegaSerifHebrew. But are these conventions appropriate for Rashi as well? Pending feedback from knowledgable users, I have included them also in Rashi fonts.

שֹׁנֵא נִשְׂא מֹשֶׁה יִרְפֹּשׁ הַנִּשְׂאִים בֹּא רֹאשׁ בֹּאָם

It's a little different for the Hadassah fonts. For these, the designer has included a cholem dot which appears above the dot of the שׁ/שׂ letters: שׁמֶר. Nevertheless, I included the same conventions in these fonts.

שׂנֵא נְשׂא מׂשֶׂה יִרְפּשׁ הַנְּשׂאִים בּא ראשׁ בּאָם

How does it look?

7.3 Numbers in a Makor document

Most of the time, Israeli authors use Arabic numbers in their articles (how ironic!). However, the numbers are entered and read in the Latin manner, from left to right, a fact which has brought many a new immigrant to their knees! One might expect that it's easy to typeset numbers—simply exit the Makor environment, enter the number, and return to Makor. Try it—you'll see that it often fails to work. Once you exit Makor, TEX reorders the Hebrew and non-Hebrew text in unexpected and disconcerting ways.

Instead, use the `\NUM` macro. To typeset 123.45 in "Hebrew," enter

```
\NUM{123.45}
```

in the source file. However, when noting page ranges, the smaller number must appear to the right of the larger. To have "456–123" appear in the Hebrew document, enter

```
\NUM{123}--\NUM{456}
```

in your source file. As another example, one way to get this entry, appropriate perhaps for a table of contents:

שיעור 12: חידת הצלופחים 166–151

is to type (in plain TEX) something like:

```
\let\DOTFILL=\dotfill
\hbox to\textwidth{\[shy‘‘wr \NUM{12}\COLON\
  chyds^ htslwfchym\DOTFILL
  \NUM{151}--\NUM{166}\]}
```

7.4 Some fine points

7.4.1 Final letters with vowels

Most of the time, final consonants have no associated vowels. On the rare occasions they do, TEX needs help. Since the vowel under the final letter you type is the last 'letter' of your word, TEX has no way of knowing that the preceding letter is actually the final consonant. You help TEX by typing a circumflex symbol or other symbol next to the consonant, before keying in the vowel. You get בָּרוּךְ by `baurookh^'`, וְיִשְׁמֶרֵךְ from `w'yish'm'r|ekh^+`, וְיחֻנֶּךָּ from `wiychun*|ek^+`, and וּמְצָאן from `oom'tse'n^#`.

I have not provided for any other intances of final vowels under the special final letterforms. If you know of other combinations, please let me know.

7.4.2 Breaking ligatures

Some of the typesetting in Makor is done via TEX's ligature mechanism. For example, you get לֹ by typing `lo`, which is what you want most of the time. (In this ligature, the superior dot has been moved to the left just a bit to clear the stem of the lamed ל.) However, in the words עָלוּל (see figure 3) and תַּשְׁלוּמֵי (the bottom of the central part of figure 2), you want to break this ligature; otherwise you get עָלֹל. One way to do that in TEX is to surround one of the members of the ligaturewith curly brackets. I typeset these foregoing words via

```
``au{l}ool
```

and

```
t^ash^'{l}oomaey
```

Typing ``aul{}ool` and `t^ash^'l{}oomaey` also works.

7.5 Turning off vowels

Savvy users of TEX and especially of LATEX know that the structure you can apply to a document is *the* great strength of these systems. The Makor system contains vocalization as an element of structure.

Fluent readers of Hebrew rarely resort to vowels. Vowels tend to make their appearance in books for younger readers, to clarify the pronunciations of names or foreign words, or other specialized situations. Nevertheless, even

Rabbinic Hebrew (RH) does not differ greatly from Biblical Hebrew (BH) in its inflection of the noun, although the neutralization of final *mem* and *nun* means that the masculine plural is often, as in Aramaic, ־ִין. Apart from the more frequent use of the archaic feminine suffix ־ַת as in כֹּהֶנֶת 'priest's wife' and אִלֶּמֶת 'dumb woman', RH also employs the suffixes ־ִית and ־וּת for example אֲרָמִית 'Aramaic' and עַבְדוּת 'servitude'. RH developed distinctive feminine plural suffixes in ־ָאוֹת (Babylonian) or ־ָיוֹת (Palestinian), for example מַרְחֲצָאוֹת/מַרְחֲצָיוֹת 'bath-houses' and ־ִיוֹת, as in מַלְכִיוֹת 'kingdoms' for BH מַלְכֻיוֹת, for nouns ending in ־וּת in the singular. Masculine plural forms sometimes differ from those that would be expected, or are normally found, in BH, for example, נְזֵקִין from נֶזֶק 'damage', שְׁוָרִים from שׁוֹר 'ox', שְׁוָקִים from שׁוּק 'market', צְדָדִים from צַד 'side', חֲצָאִין from חֲצִי 'half', and שְׁלוּחִין from שָׁלִיחַ 'envoy'. The same is true of feminine nouns, for example אוֹתִיּוֹת from אוֹת 'letter (of alphabet)', בְּרִיתוֹת from בְּרִית 'covenant (without plural in BH)', and אִמָּהוֹת from אֵם 'mother'.

Some masculine nouns take the feminine plural suffix ־וֹת, for example, חֲנֻיוֹת from חֵן 'favour', כְּלָלוֹת from כְּלָל 'rule', תִּינוֹקוֹת from תִּינוֹק 'baby', חֲיָלוֹת from חַיִל 'army', עֲיָרוֹת from עִיר 'city', and מֵימוֹת from מַיִם 'water'. Similarly, there are some feminine nouns which take the masculine plural suffix ־ִים—יוֹנִים from יוֹנָה 'dove', נְמָלִים from נְמָלָה 'ant', and בֵּיצִים from בֵּיצָה 'egg', for example. Occasionally, both types of plural are evidenced, as with יָמִים/יָמוֹת from יוֹם 'day' or שָׁנִים/שָׁנוֹת from שָׁנָה 'year', with each form having a slightly different shade of meaning and the 'feminine' variant only used with suffixes. In RH we sometimes find plurals of nouns only attested in the singular in BH, for example אֲבָרִים from אֵבֶר 'limb', דְּשָׁאִין from דֶּשֶׁא 'grass', and תְּמִדִים from תָּמִיד 'daily sacrifice'. Likewise, there are singular forms of nouns only attested in the plural in BH, for example אִלְמוּג 'coral-wood', בֵּיצָה 'egg', and בָּצָל 'onion'. The dual is used more than in BH, with existing forms retained and new ones created, for example מַסְפָּרַיִם 'scissors' and בֵּינָתַיִם 'meanwhile'. (1993: Sáenz-Badillos, *A History of the Hebrew Language*, Cambridge University Press, pp. 188-89.)

Figure 6: Makor fonts in combination with Roman.

if you don't want to typeset the vowels, it makes sense to include them in the input. For example, I can typeset

את חגיגת הארוסין של חיותה קבעו במהירות...

by typing

```
‘s chgygs^ h‘rwsyn shl chyws^h qv‘‘w bmhyrws^...
```

but I might rather type

```
‘es^ chagiygas^ hau‘aeroosiyn sh^el chayoos^auh qauv’‘‘oo
bim’hiyroos^...
```

even if I didn't want the vowels to print, because the vocalized input is so much easier to proofread (at least, it is after you get used to the Makor conventions!). We turn vowels on and off with the `\V` (enable vowels) and `\CXLV` (cancel vowels). These commands also adhere to standard TEX grouping conventions, so I get

את חגיגת הארוסין של חיותה קבעו במהירות...

or even

אֶת חגיגת הָאֲרוּסִין של חַיוּתָה קבעו בִּמְהִירוּת...

simply by monkeying with these commands. One way to typeset the last of these is via

```
‘es^ \CXLV chagiygas^ \V hau‘aeroosiyn
{\CXLV sh^el} chayoos^auh
{\CXLV qauv’‘‘oo} bim’hiyroos^...
```

8 Font selection

Not only do the Hebrew fonts require special adjusting for use with Makor, but it is also true that we need special treatment when fonts are selected for use. Consequently, Hebrew fonts should be selected according to the rules of this section. **Do not** use any of the usual font selection commands.

As with any TEX document, though, fonts must be made known to TEX, and fonts must be selected for use. Font definition is accomplished by means of the `\hfontdef` command, which takes **three** arguments:

1. the name by which you will refer to the font;
2. the Makor family name of the font; and
3. the size of the font you want to use.

Makor family names are, at the moment, slightly non-intuitive. They consist of a recognizable family name, to which is appended two additional letters. At the moment, these additional letters have no real significance, but in the future, they will carry a significance all their own. You can see these fonts in figure 4. Here they are again in figure 7, with their Makor family names. Thus, if you say something like

```
\hfontdef{EZRA}{ezramm}{10.5pt}
```

the nickname `EZRA` refers to font `ezramm` at a size of 10.5 pt.

Now, how do you invoke this font? You need the special `\hfont` command, which is subject to the same grouping rules as any other font selection command. Thus, continuing the above example, we get this font if we type

```
{\hfont{EZRA}...}
```

inside the Makor environment.

For reasons that will be explained below, I recommend naming your font with UPPERCASE nicknames.

In addition to the above commands, there is also commands `\V` and `\CXLV` to enable and disable vowels, and an additional command `\declarehdefault` to typeset using a particular font in the absence of additional instructions. Thus, if typed

```
\declarehdefault{EZRA}
```

right after the `\hfontdef{EZRA}` command, we would automatically get this font unless we explicitly entered another `\hfont` command.

9 A Few points on use

One of the main ways in which Makor works is by altering the category codes of the vowels you type within the Makor `\[...\]` environment. You don't

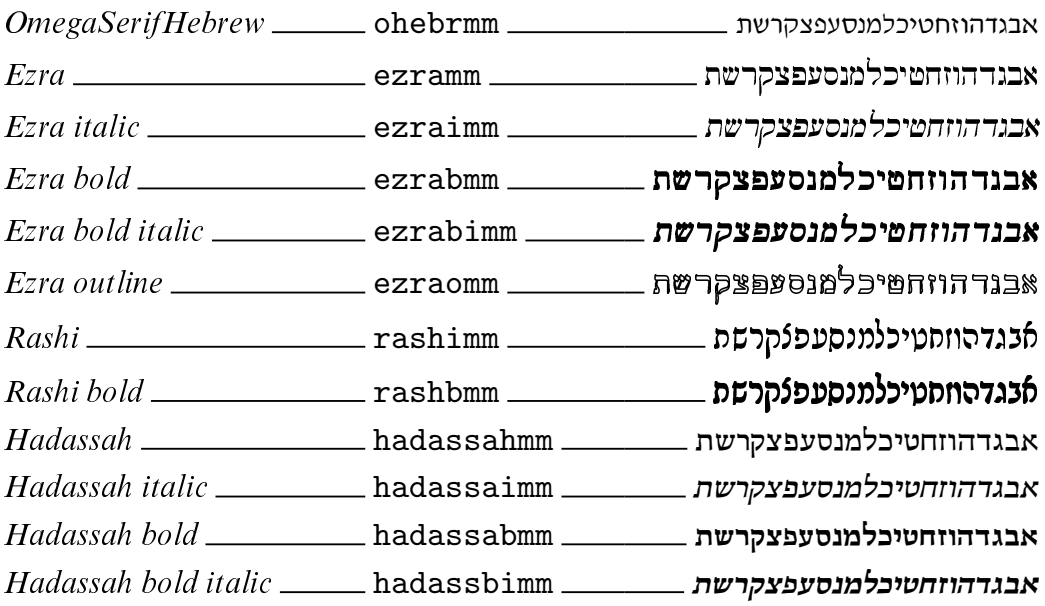

Figure 7: Makor fonts.

need to know what 'category codes' are except to understand that TEX normally groups the characters into distinct categories which are important to the way TEX reads your document file (among other things). Monkeying with these codes can have unexpected and undesirable results unless you take great care. I have tried to take great care that the Makor macros treat this new categorization in a robust manner, but there are inevitable difficulties. For example, you cannot use Makor input in the arguments of macros and commands, because the default category codes will already have been assigned to them when TEX reads in the macro arguments. Since section head titles and so on are arguments to section head commands, this means you can't have Makor in these heads, at least not yet. However, many of the remaining comments in this section address these issues.

This business about assigning different category codes to vowels has another downside in Makor: TEX commands are no longer perceived as the same commands! For example, within the Makor environment, the command

```
\hspace
```

is now interpreted as the (unknown) command `\hsp`, followed by an active `a`, then a character `c`, followed finally by an active `e`. For this reason, I sug-

gest that any macros that you use within the Makor environment consist solely of uppercase letters. Uppercase letters retain the same categorization—and hence the meaning—in Makor as in TEX, and so you run far fewer risks of unexpected surprises if you stick to UPPERCASE macro names.

9.1 Including TEX or LATEX commands in Makor

Makor provides the `\EXEC` command to EXECute commands within Hebrew typesetting. So, for example, to get גד אב, you type

```
\[‘b\EXEC{\hskip2pc}gd\]
```

Any string of commands can serve as an argument to `\EXEC`.

9.2 Macros containing Hebrew text

The business about category codes alluded to above means that you have to be careful about defining macros containing Hebrew input. Suppose I want to define `\MKR` to typeset מָקוֹר. I can't say

```
\def\MKR{mauqOr}
```

because TEX assigns to the replacement text the usual category codes. The trick is to create the macro *inside* of the Makor environment, using global definitions (because `\[...\]` creates a group), and to use `\GDEF` which has been `\let` equal to `\gdef`. As you can see, you'll need to use plain TEX syntax to create new macros (at least for the moment). Thus, we type

```
\[\GDEF\MKR{mauqOr}\]
```

to create the `\MKR` macro.

9.3 White space around a paragraph

You have to be careful to get indentation correct, particularly when enter paragraphs that are entirely (or predominantly) Hebrew. Please note, you cannot have more than one paragraph within `\[...\]`. Terminate each paragraph ith `\]`, and begin the new one with `\[`.

If you enter a paragraph of text like this:

```
\[laukhaen chakoo-liy n'‘um-ydwd l'yOm qoomiy l'‘‘ad kiy
mish^'pautiy l|e‘:esof gOyim l'qauv'tsiy mam'laukhOs^ lish^pokh^'
‘‘:alaeyhem za‘‘'miy kol x:arOn ‘apiy kiy b'‘eish^ qin'‘aus^iy
t^|"‘+khael k+l-h+‘|+rets.\]
```

you get

לָכֵן חַכּוּ־לִי נְאֻם־יְדוד לְיוֹם קוּמִי לְעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְּאֵשׁ קִנְאָתִי תֵּאָכֵל כָּל־הָאָרֶץ.

which may not be exactly what you want. To suppress the indentation on the *left*, use the standard `\noindent` command:

```
\noindent\[laukhaen chakoo-liy...
    ...\]
```

To get indentation on the *right* side, use the special `\HINDENT` command. At the end of the paragraph, you can control the appearance of the last line with one of a pair of Makor commands. For example, to get the last line flush right, use the `\HPAR` command:

```
\noindent\[\HINDENT laukhaen chakoo-liy...
    ...k+l-h+‘|+rets.\HPAR\]
```

to get:

לָכֵן חַכּוּ־לִי נְאֻם־יְדוד לְיוֹם קוּמִי לְעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְּאֵשׁ קִנְאָתִי תֵּאָכֵל כָּל־הָאָרֶץ.

It's also possible to *center* the last line of the Hebrew paragraph, using a trick that relies on mixing left-right and right-left modes. We type

```
\noindent\[laukhaen chakoo-liy...
    ...k+l-h+‘|+rets.\CENTERLASTLINE\]
```

to get:

לָכֵן חַכּוּ־לִי נְאֻם־יְדוד לְיוֹם קוּמִי לְעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְּאֵשׁ קִנְאָתִי תֵּאָכֵל כָּל־הָאָרֶץ.

Alas, this trick does not seem to work in pure English language typesetting.

9.4 Hebrew alignments and tables

I'd like to describe here a macro—a variation of plain TEX's `\halign`—that makes it possible to type Hebrew columns left to right and have them typeset

right to left. I used `\halign` as a model rather than LaTeX's `\tabular` because `\halign` has always been more versatile.

Caveat! This macro works by writing certain information to a temporary file; it is this operation that allows Makor to reverse the order of columns. However, as a result, strange things are apt to happen if you go too wild in your table macros. Some of this strangeness will be discussed below. Always be alert to the fact that you may have to reorganize or your tabular data or set up the table in a different way to get it to typeset. I invite motivated readers to re-do these macros in a more robust manner.

Simple tables, such as those in figures 1, 2, and 7, require no special treatment. The table in figure 8 is a slightly different story. Makor provides a

`\HEBALIGN`

alignment macro for producing tables like this. Although `\HEBALIGN` is no way near as robust or versatile as `\halign` (the plain TeX antecedent of LaTeX's `\tabular` environment), I hope it will be of use. Basically, we seek to enter enter columns and column data from left to right and have it typeset in right to left format.

As with all TeX environments, `\HEBALIGN` requires a template followed by any number of row data. Both the rows and the templates are arguments of a `\CR` macro, which *precedes* the template or row data. As in standard TeX, the tabbing symbol `&` separates each column. *Unlike* standard TeX, there must be the same number of `&`'s on each line. (Otherwise, the data will line up in a manner you won't have anticipated.) In particular, TeX's neat `&&` convention for the template row can *not* be used in `\HEBALIGN`. Essentially, any formatting commands can appear in the template specification. However, you cannot use the `#` tabbing symbol; there is a category code conflict. Use the Makor macro `\H` instead. Thus, a simple table could be typed as

```
\tabskip=1.5pc
\hfontdef{X}{ezramm}{10pt}
\HEBALIGN{\CR{\hfil\[\H\]&\[\H\]\hfil}% end of template
\CR{‘&baeys^}% end of first row
\CR{gimel&d}% end of second row
} % end of \HEBALIGN
```

and which typesets

בֵּית א
גִּמֶל ד

This could also have been coded as

```
\HEBALIGN{\CR{\hfil\H&\H\hfil}% end of template
\CR{\[‘\]&\[baeys^\]}% end of first row
\CR{\[gimel\]&\[d\]}% end of second row
} % end of \HEBALIGN
```

There's also a `\HEBNOALIGN` macro, which works like the usual `\noalign` command. To get

בֵּית א
Gimel ד

you type

```
\HEBALIGN{\CR{\hfil\[\H\]&\[\H\]\hfil}
\HEBNOALIGN{\vskip2pt\hrule\vskip2pt}
\CR{‘&baeys^}
\HEBNOALIGN{\vskip2pt\hrule\vskip2pt}
\CR{\omit Gimel&d}
\HEBNOALIGN{\vskip2pt\hrule\vskip2pt}
}
```

9.5 Excessive complexity

`\HEBALIGN` is no way near as robust as plain TEX's `\halign`. So, a construction like

a **b**
c *d* **g**
e *f*

does not seem to be directly possible with `\HEBALIGN`.

To accomplish something similar, you need to create a box with a statement like

```
\setbox0=\vbox{\declarehdefault{hmr}\baselineskip=1pt
\HEBALIGN{\CR{\hfil\H\hfil&\hfil\H\hfil}
\CR{\[g\]&\[d\]}
\CR{\[h\]&\[w\]}}}
```

and then use this box in the main table:

```
\tabskip=1.5pc\HEBALIGN{\CR{\hfil\H\hfil&\hfil\H\hfil}
\CR{\[‘\]&\[v\]}
\CR{$\vcenter{\boxO}$&\[z\]}}
```

which yields:

The lesson is that you have to be prepared to adopt non-standard approaches to Hebrew typesetting with Makor.

9.6 Protection

Owing to the aforementioned conflicts in category codes, you need to protect a command which is not primitive. For this you use the Makor command

`\MPROTECT`

inside the `\def`inition for `\myprotects`, which Makor examines. Thus, if we type

```
\def\myprotects{\MPROTECT\multispan\MPROTECT\bf}
\HEBALIGN{\CR{\H&\H&\H&\hfil\[\H\]&\[\H\]\hfil}% end of template
\HEBNOALIGN{\vskip2pt\hrule\vskip2pt}
\CR{\multispan3:\hfil Silly\hfil:&\multispan2\hfil\[sh^aulOm!\]\hfil}
\HEBNOALIGN{\vskip2pt\hrule\vskip2pt}
\CR{\[1\]&\[2\]&\[3\]&‘&baeys^}% end of first row
\HEBNOALIGN{\vskip2pt\hrule\vskip2pt}
\CR{1&2&3&\omit\bf Gimel&d}% end of second row
\HEBNOALIGN{\vskip2pt\hrule\vskip2pt}
} % end of \HEBALIGN
```

you get

	שָׁלוֹם! :	Silly	:	
בֵּית	א	3	2	1
ד	**Gimel**	3	2	1

about which I need to make a few comments: (1) the value of `\tabskip` is 24.0pt; (2) numerals taken from the prevailing Hebrew font may well differ from those taken from the prevailing Roman font; and (3) I needed to `\MPROTECT` both `\multispan` and `\bf`, the latter because the LaTeX/NFSS assigns a rather different expansion than does plain TeX. When in doubt, you can always `\MPROTECT` a command; it should do no harm in any case.

9.7 Suppressing reversal

If necessary, you can suppress the reversal process of several columns. Do this by enclosing the *data* (not the template) in curly brackets, and these brackets will certainly span several columns. For example, if we make the simple change

```
\tabskip=2pc\def\myprotects{\MPROTECT\multispan\MPROTECT\bf}
\HEBALIGN{\CR{\H&\H&\H&\hfil\[\H\]&\[\H\]\hfil}
\HEBNOALIGN{\vskip2pt\hrule\vskip2pt}
\CR{\multispan3:\hfil Silly\hfil:&\multispan2\hfil\[sh^aulOm!\]\hfil}
\HEBNOALIGN{\vskip2pt\hrule\vskip2pt}
\CR{{\[1\]&\[2\]&\[3\]}&‘&baeys^}%% <== OBSERVE EXTRA BRACKETS!
\HEBNOALIGN{\vskip2pt\hrule\vskip2pt}
\CR{1&2&3&\omit\bf Gimel&d}
\HEBNOALIGN{\vskip2pt\hrule\vskip2pt}
} % end of \HEBALIGN
```

to the code for the previous table, we get this instead:

	שָׁלוֹם!	:	Silly	:
בֵּית	א	1	2	3
ד	**Gimel**	3	2	1

Figure 8 puts most of this stuff together. It is the product of

```
\newdimen\HTABSKIP \HTABSKIP=8pt
\declarehdefault{XX}
\let\OMIT=\omit \let\HFIL=\hfil \let\QUAD=\quad
\def\SPACEDRULE{\vskip2pt\hrule\vskip2pt}
\def\SSPACEDRULE{\vskip3pt\hrule height1.5pt\vskip3pt}
\def\myprotects{\MPROTECT\SPACEDRULE\MPROTECT\multispan\MPROTECT\hfont
\MPROTECT\QUAD\MPROTECT\SSPACEDRULE\MPROTECT\it}
\tabskip=0pt
\noindent\HEBALIGN{\CR{
 \hfil\H\tabskip=0pt&\hfil\H&\hfil\H&\hfil\H&
 \it\hfil\H\hfil&%
 \hfil\H&\hfil\H&\hfil\H&\tabskip=0pt\hfil\H\tabskip=\HTABSKIP}% end template
\HEBNOALIGN{\SSPACEDRULE}
\CR{\multispan9\hfil\[\hfont{XXBB}his^’pal*ael\]\hfil}
\HEBNOALIGN{\SPACEDRULE}
\CR{\multispan9\hfil\[\hfont{XXB}bnyyn hs^f‘‘l\QUAD gzrs^ shlmym\]\hfil}
\CR{\multispan4\hfil\[\hfont{XXB}zkhr\]\hfil&&\multispan4\hfil\[\hfont{XXB}%
nqvh\]\hfil}
\HEBNOALIGN{\SPACEDRULE}
\CR{\OMIT\HFIL\[\hfont{XB}‘‘vr\]\HFIL&\OMIT\HFIL\[\hfont{XB}hwwh\]\HFIL&%
  \OMIT\HFIL\[\hfont{XB}‘‘s^yd\]\HFIL&%
  \OMIT\HFIL\[\hfont{XB}tswwy\]\HFIL&&\OMIT\HFIL\[\hfont{XB}‘‘vr\]\HFIL&%
```

הִתְפַּלֵּל

בניין התפעל גזרת שלמים

זכר					נקבה			
עבר	הווה	עתיד	צווי		עבר	הווה	עתיד	צווי
הִתְפַּלַּלְתִּי	מִתְפַּלֵּל	אֶתְפַּלֵּל		*I*	הִתְפַּלַּלְתִּי	מִתְפַּלֶּלֶת	אֶתְפַּלֵּל	
הִתְפַּלַּלְתָּ	מִתְפַּלֵּל	תִּתְפַּלֵּל	הִתְפַּלֵּל!	*you*	הִתְפַּלַּלְתְּ	מִתְפַּלֶּלֶת	תִּתְפַּלְּלִי	הִתְפַּלְּלִי!
הִתְפַּלֵּל	מִתְפַּלֵּל	יִתְפַּלֵּל		*(s)he*	הִתְפַּלְּלָה	מִתְפַּלֶּלֶת	תִּתְפַּלֵּל	
הִתְפַּלַּלְנוּ	מִתְפַּלְּלִים	נִתְפַּלֵּל		*we*	הִתְפַּלַּלְנוּ	מִתְפַּלְּלוֹת	נִתְפַּלֵּל	
הִתְפַּלַּלְתֶּם	מִתְפַּלְּלִים	תִּתְפַּלְּלוּ	הִתְפַּלְּלוּ!	*you*	הִתְפַּלַּלְתֶּן	מִתְפַּלְּלוֹת	תִּתְפַּלֵּלְנָה	הִתְפַּלֵּלְנָה!
הִתְפַּלְּלוּ	מִתְפַּלְּלִים	יִתְפַּלְּלוּ		*they*	הִתְפַּלְּלוּ	מִתְפַּלְּלוֹת	תִּתְפַּלֵּלְנָה	

Figure 8: A Hebrew verb conjugation.

```
  \OMIT\HFIL\[\hfont{XB}hwwh\]\HFIL&\OMIT\HFIL\[\hfont{XB}‘‘s^yd\]\HFIL&%
  \OMIT\HFIL\[\hfont{XB}tswwy\]\HFIL}
\HEBNOALIGN{\SPACEDRULE}
\CR{\[his^’pal*al’t^iy\]&\[mis^’pal*ael\]&\[‘es^’pal*ael\]&&
I&\[his^’pal*al’t^iy\]&\[mis^’pal*eles^\]&%
\[‘es^’pal*ael\]&}
\CR{\[his^’pal*al’t^au\]&\[mis^’pal*ael\]&\[t^is^’pal*ael\]&%
\[his^’pal*ael!\]&you&\[his^’pal*al’t^’\]&%
\[mis^’pal*eles^\]&\[t^is^’pal*’liy\]&\[his^’pal*’liy!\]}
\CR{\[his^’pal*ael\]&\[mis^’pal*ael\]&\[yis^’pal*ael\]&&(s)he&%
\[his^’pal*’lauh\]&\[mis^’pal*eles^\]&\[t^is^’pal*ael\]&}
\HEBNOALIGN{\SPACEDRULE}
\CR{\[his^’pal*al’noo\]&\[mis^’pal*’liym\]&\[nis^’pal*ael\]&&we&
\[his^’pal*al’noo\]&\[mis^’pal*’lOs^\]&\[nis^’pal*ael\]&}
\CR{\[his^’pal*al’t^em\]&\[mis^’pal*’liym\]&\[t^is^’pal*’l{}oo\]&%
\[his^’pal*’l{}oo!\]&you&\[his^’pal*al’t^en\]&%
\[mis^’pal*’lOs^\]&\[t^is^’pal*ael’n+h\]&\[his^’pal*ael’n+h!\]}
\CR{\[his^’pal*’l{}oo\]&\[mis^’pal*’liym\]&\[yis^’pal*’l{}oo\]&&
they&\[his^’pal*’l{}oo\]&\[mis^’pal*’lOs^\]&%
\[t^is^’pal*ael’nauh\]&}
\HEBNOALIGN{\SSPACEDRULE}
}% end of HEBALIGN
```

Note carefully the shenanigans with `\tabskip`, which look odd but aren't. Remember, the template line is reversed in the typesetting process.

9.8 LaTeX and Makor

You may run into additional clashes between Makor and LaTeX. I hope to resolve these difficulties soon.

10 Additional tools

10.1 fonttbl

A couple of tools included with the Makor package may be useful to you. There is a file `fonttbl.tex` which prints out a font table for a Hebrew font of your choice. For example, if I modify the top of the file so a line defining `\myfont` looks like

```
\def\myfont{hadassab at 10pt }
```

and then run this file through TeX and `dvipdfm` (or whatever works for you), I get a table like figure 9. (In reality, there will be a few additional rows and some other minor changes when you do it yourself in real life.)

The advantage of such a table is that it may reveal the presence of unsuspected characters that may, on occasion, be of use. For example, figure 9 shows that the Israeli 'new shekel' symbol appears in position 164, along with other Yiddish and Ladino glyphs, odd ligatures, and miscellaneous other things. If we say

```
\def\NEWSHEKEL{\char164\relax}
```

in or something equivalent our document, then we get ₪ when we use this command in an appropriate Makor environment.

10.2 refcard

The file `refcard.tex` allows you to print out a one-page summary of Makor, its commands, and examples of usage. You can customize it to the point of various font parameters. Then, when you run it through Omega or eTeX, you get figure 10.

The biblical quote, which forms part of the reference card, and which has apeared elsewhere in this document, is the Hebrew equivalent of "the quick brown fox...;" all Hebrew letters (including the final variants) appear in this

Font Table for font hadassabmm at 10pt

Figure 9: A Makor font table.

Reference Card for TEX Typesetting with Makor

To typeset the character on the left, type the sequence on the right.

Consonants

א	‘
ח	v
ג	g
ד	h
ר	w
ז	z
ח	ch
ח	x
ט	t
י	y
ע	kh
ל	l
מ	m
נ	n
ס	s
ע	‘‘
פ	f
צ	ts
ק	q
ר	r
ש	sh
שׁ	shˆ
שׂ	ˆs
ת	sˆ

Special Dagesh

בּ	b
כּ	k
פּ	p
תּ	tˆ

Dagesh Letters

בּ	v*
גּ	g*
דּ	h*
וּ	w*
זּ	z*
טּ	t*
יּ	y*
כּ	kh*
לּ	l*
מּ	m*
נּ	n*
סּ	s*
פּ	f*
צּ	ts*
קּ	q*
רּ	r*
שּ	sh*
שׁ	shˆ*
שׂ	ˆs*
תּ	sˆ*

End of Word

ךְ	kh
ךְ	k
ם	m
ן	n
ף	f
ץ	ts

Defective Cholem

בֹא	bo‘
בֹאם	bo{}‘aum

‘Non-Final’ Finals

ךָ	khˆ
ךְ	kˆ
ם	mˆ
ן	nˆ
ף	fˆ
ץ	tsˆ

Vocalized Finals

ךָ	khˆ’
ךְ	kh$
ךָ	khˆ+
ךָ	kh/
ךְ	kˆ’
ךָ	kˆ+
ךָ	k/
ךָ	nˆ#
ךָ	n/

Basic Vowels

אֶ	‘ae
בֵ	vei
גִ	g’
דַ	da
הָ	he
וִ	wi
זֻ	zu
חֹ	cho
טָ	tau
טָ	t+
וֹ	oo
וּ	w*
◌ֹ	O

Final Chet-Patach

רֵיחַ	raey_ach

Oddments

־	_
–	--
—	---
״	""
׳	\’
צׄ	ts‘
ץׄ	ts‘ (EOW)

More Vowels

יִ	y:a
עֶ	kh:e
לֶ	l:+
מִ	m|
נִ	n|"
סִ	s|i
אַ	‘‘|a
פִּ	f|e
צְ	ts|+
קֶ	q|’

Special Cases

לֹ	lo
לֹ	l*o
לוֹ	l{}oo
לוֹ	l*{}oo

In general, use {} to break up ligatures, as shown. Final glyphs demand other solutions. For example, if you type `sˆts‘` you get תׄץ; to get תצא, type `sˆts\NOBOUNDARY‘`.

Commands

`\input makor`
`\[...\]`
`{\CXL` <*text*>`}`
Typesets vowel-less consonants.

`\V`
Typesets vowels with their consonants.

`\NUM{`<*numbers*>`}`
Typesets *numbers* properly.

`\EXEC{`<*cmd list*>`}`
Executes the list of commands *cmd list*.

`\NOBOUNDARY`
`\:`
Typesets the colon.

`\’`
Typesets the right quote.

Hebrew Fonts

`\hfontdef{`<*fnm*>`}%`
`{`<*hfont*>`}{`<*size*>`}`
Establishes the name *fnm* to stand for the Hebrew font *hfont* at size *size*.

`\declarehdefault{`<*fnm*>`}`
Sets *fnm* as the default Hebrew font.

`{\hfont{fnm}...}`
Selects Hebrew font *fnm*.

White Space

`\HINDENT`
`\HPAR`
`\CENTERLASTLINE`
`\HINDENT` indents at right. `\HPAR` makes last line of the paragraph flush right. `\CENTERLASTLINE` centers paragraph’s last line.

The simplest way to get:

לָכֵן חַכּוּ־לִי נְאֻם־יְדוּד לְיוֹם קוּמִי לָעַד כִּי מִשְׁפָּטִי לֶאֱסֹף גּוֹיִם לְקָבְצִי מַמְלָכוֹת לִשְׁפֹּךְ עֲלֵיהֶם זַעְמִי כֹּל חֲרוֹן אַפִּי כִּי בְאֵשׁ קִנְאָתִי תֻּאָכֵל כָּל־הָאָרֶץ׃ צפניה נ:ח

is via this TEX input:

```
\input makor
\hfontdef{hrm}{ezramm}{12pt}\declarehdefault{hrm}
\hfontdef{hl}{ezramm}{8pt}
\noindent\[laukhaen chakoo-liy n’‘um-ydwd l’yOm qoomiy l’‘‘ad kiy
mishˆ’pautiy l|e‘:esof gOyim l’qauv’tsiy mam’laukhOsˆ lishˆpokhˆ’
‘‘:alaeyhem za‘‘’miy kol x:arOn ‘apiy kiy b’‘eishˆ qin’‘ausˆiy
tˆ|"‘+khael k+l-h+‘|+rets\:\ \CXLV\hfonthl[ts’fan’yauh g\:ch]\CENTERLASTLINE\]
\bye
```

If the source file is `hsource.tex`, then compile it by means of: `omega hsource`, `etex hsource`, `pdfetex hsource`, and so on.

Figure 10: A Makor reference card.

single verse from Zephaniah at least once. (Are there other verses with this characteristic? Other Hebrew sentences?)

10.3 Other files

The file `koheleth.tex` provides the TEX/Makor code for the cover of this manual. Its explanation requires another manual about this size. Perhaps I'll get to it one day.

The file `makormap.tex` allows you to generate a keyboard map like figure 11. You need to modify the command

```
\capmap{ohebr}{im}
```

which is, essentially, the single line of this file. At the moment, the first argument can only be `ezra`, `rashi`, `ohebr` (for OmegaSerifHebrew), or `hadassah`. The second argument can only be `mm` for the standard Makor keyboard, or `im` for the experimental Israeli keyboard.

11 Processing this manual

The presence of TrueType fonts in the manual made the processing of this manual problematic, for reasons that remain mysterious to me.

It was not a problem to run the file through either of `Lambda` or `elatex`. (`Lambda` is the LATEX-equipped version of Omega.) Much to my disappointment, the resulting `.dvi` file could not be fed to `dvips` (version 5.86). It's not impossible that more current versions of `dvips` would work properly, at least with respect to TrueType fonts, but I did not investigate this.

`Pdfelatex` was even less forgiving. It complained bitterly about the absence of encoding vectors for the TrueType fonts. I created such files, and included them as part of the `psfonts.map` file, but to no avail.

The final and only successful method involved using `dvipdfm` as the TEX post-processor. This program, which was part of the MikTEX implementation of TEX which I used, was automatically set up as part of the installation process. As you can tell from the name, `dvipdfm` works like `dvips`, but produces a `.pdf` file rather than a PostScript file. `dvipdfm` was totally unfazed by the presence of TrueType. I needed to nothing special beyond installing the TrueType fonts properly.

In the presence of `refcard.eps`, `koheleth.pdf`, and `makormap.pdf` (all provided with the Makor software), run the file `makorman.tex` through an extended version of LaTeX (this is a LaTeX file), and possibly through `dvipdfm`. That's it!

I included the source files with this distribution to serve as examples of the use of Makor. I fear, though, that several of the examples, though, are nevertheless opaque without some additional explanation. Although I have no time for that now, I hope to get to that in the future.

12 Experimental fonts

12.1 Israeli keyboard layout

Experienced Israeli typists have complained to me that they would prefer to type Hebrew input as if they were typing on an Israeli keyboard. That is, if you press the key corresponding to the 'T' on a typical American keyboard, you don't get the Hebrew ט, but rather the key you would get if you touched the same key on an Israeli keyboard. That key would be labelled א—and that's what you get in Makor if you use the Israeli-Makor experimental fonts. That is, define the fonts which use the usual Makor conventions but assume an Israeli layout. These fonts are identified by the two characters '`im`' instead of `mm`. That is, you might type

```
\hfontdef{EZRAIL}{ezraim}{10pt}
```

to enable an Ezra-Israeli font.

There is a file `makormap.tex` which, with the obvious modifications at its beginning, allow you to typeset a keymap for one of these experimental fonts. Figure 11 displays one such map. Experimental fonts for Rashi, Rashi bold, Ezra, Ezra italic, Ezra bold, Ezra bold italic, Ezra outline, and Omega serif Hebrew are provided. I call them experimental because, not having a proper Israeli keyboard, I can't test them fully. Please let me know if there are any difficulties or problems.

Keyboard Map for Makor Font ezra, 'im' Layout

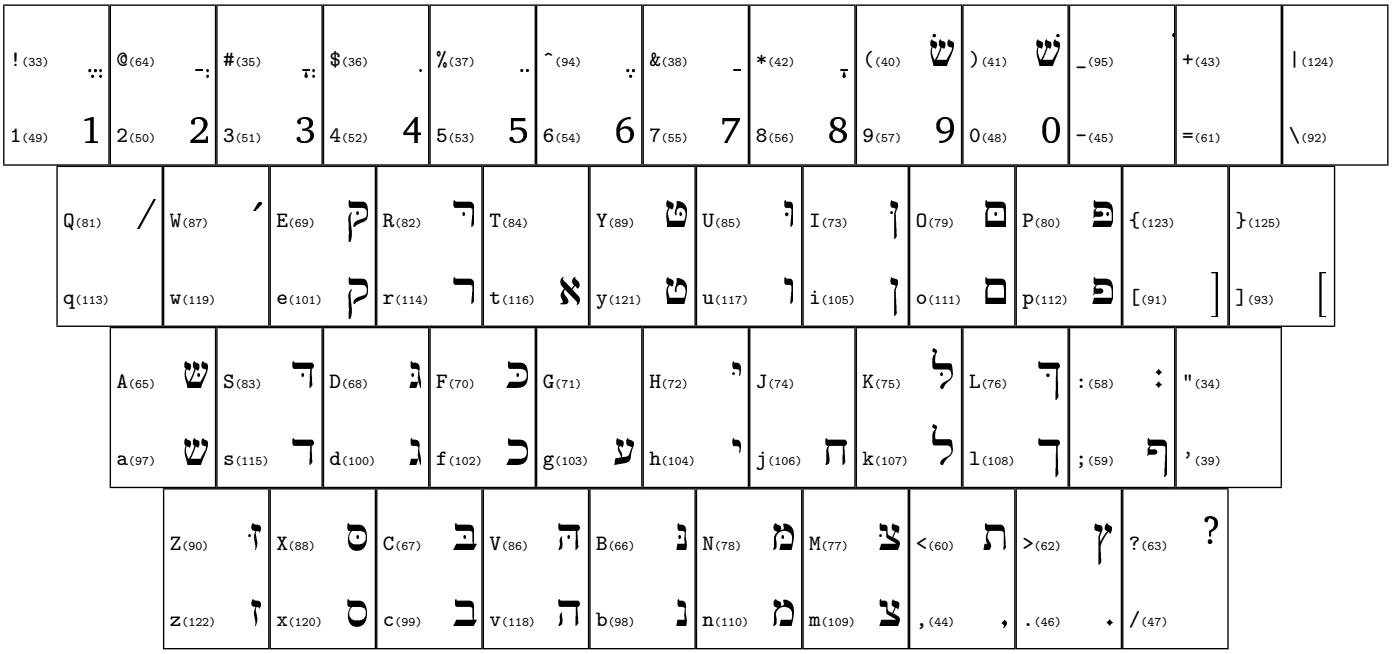

Figure 11: An Israeli keymap. Each 'key' indicates the characters you get in a standard American keyboard for upper- and lowercase, together with their Ascii values, and the Israeli characters.

13 Future work; acknowledgments; bugs

13.1 Acknowledgments

I am grateful to the following folk who took the time out not only to play with this package but to alert me to problems and deficiencies: Giuseppe Bilotta, Jeremiah Cataldo, Tzafrir Cohen, Matt Fisher, Sam Isaacson, Manfred Kirschhock, Bernice Lipkin, Adam Lyon, Thomas Neumann, and Tsuguya Sasaki. Many thanks, and thanks also for all your suggestions.

I am pleased to be able to publically acknowledge my gratitude to the CUNY Institute for Software Design and Development (CISDD) for their financial support of this project.

13.2 Future work

Here are some of the things still needing to be done.

1. adapt Makor for use with an Israeli keyboard;
2. adapt Makor for Yiddish, Ladino, … input and typesetting;
3. compatibility with ArabTEX;
4. develop the Perl script for adapting any well-formed Hebrew font for use with Makor;
5. work on a User Guide for this Perl Script;

13.3 Reporting bugs or other problems

Please contact me at `ahoenig@suffolk.lib.ny.us` to report any problems or bugs. Thanks for your consideration and assistance!

14 Appendix: Using ttf-edit with Hadassah fonts

Several of the raw fonts that are part of Makor are true type fonts, and I found them somewhat problematical to deal with. There are several guides for using TTF with TEX, but true type fonts tend to be ill-formed, at least from TEX's

point of view. They often contain far more than 256 characters, and these characters are apt to be presented in some odd and quirky ordering.

The Hadassah fonts were delivered to me in True Type format, and it became important to deal with them. My tool of choice was Richard Kinch's program `ttf_edit` (TrueTeX Systems; `kinch@truetex.com`). At the time (late fall, 2001), this program was made available to me in a beta-test version. See also `www.truetex.com`.

I issued the following series of commands:

```
ttf_edit.exe hadassah.ttf font 3 1 afm >newfont.afm
```

created an `.afm` file corresponding to `hadassah.ttf`. I edited this to form `new.afm`, which is distributed with makor.

Next, I typed

```
ttf_edit hadassah.ttf font new.afm 3 1 encode
  nhadassah.ttf gen
```

The font `nhadassah.ttf` formed the raw font for all the Makor fonts.

I likewise executed the same pair of commands (with obvious modifications) for the three other Hadassah variants.

References

[1] A. Hoenig. *TEX Unbound: Strategies for Fonts, Graphics, and More* New York: Oxford University Press, 1998.

[2] S. Toledo. *A Simple Technique for Typesetting Hebrew with Vowel Points.* TUGboat 20(1) 15–20 (March, 1999).