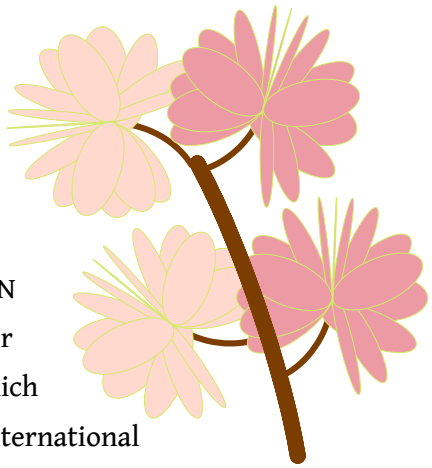
Chapter 18. Expanding Technical Vocabulary Using the **F**--- Family



The 4,096 vocabulary elements of Nwehu Nuswei's (NN's) **F**--- family are not assigned specific meanings. They are reserved to provide technical terms in any and all fields that have not been assigned adequate vocabulary in the other 15 families. The intention is that academic and technical authorities would determine how to assign vocabulary using the F--- genus.

Each set of F--- words assumes a meaning only by combining a predefined NN word ("headword") with a definition provided by an appropriate technical or academic authority. Minerology is used to illustrate two possible ways in which pre-assigned meanings can be associated with technical terminology. The International Minerological Association (IMA) lists 5673 official mineral names (as of this writing). The technical classification of minerals used for this illustrative example is based on the "Nickel-Strunz" (N-S) 10th edition system, maintained by Mindat.org, an outreach of the Hudson Institute of Minerology. (https://www.mindat.org/)

Minerology is assigned genus *Dw--* and is illustrated in file "Nwehu Nuswei/E0 D-/E8 Dw-.ods".

18.1. How to Assign Expansion Words

Perhaps the simplest method for assigning technical expansion vocabulary to F--- family words would be to start with *Fuhu* for each headword, and assign each expansion word arbitrarily in sequence. But there are several considerations: can the assignment be made as "rational" as possible? (That is, can it conform in some way to the phonetic symbolism principles of NN?) Can it be made as easy as possible to learn? Can the words be assigned in a way that scales up to accomodate very large sets of technical terms? For minerals, the IMA's list of 5673 is too large to fit in a single expansion series: for example, *Dwhu-fuhu* 'Mineral 0x0000' through *Dwhu-fwoibwoi* 'Mineral 0xFFFF' would only accomodate 4096 minerals. Instead, a series of *Dw--* headwords is predefined dividing minerals by their high-level classifications, and subordinate classifications can be defined using a series of *F----* words beneath each high-level classification.

The minerology example in Dw-- presents two techniques: Expansion Plans 1 and 2.

- Sheet --x- uses Plan 1 for the Native Elements series;

- Sheet --s- uses Expansion Plan 2 for the Sulfides and Sulfosalts series;
- Sheet --c- uses Plan 1 for some sub-series and Plan 2 for others to populate the first portion of the Silicates and Germinates series.

Both plans will be explained in detail here, but having experimented with both plans, Expansion Plan 2 is recommended. File "Expansion Template.ods" in the Templates folder makes a generalized form available for both.

18.2. Mineral Classification

In order to make a logical assignment of words, it is necessary to understand how the technical terms are grouped and subdivided by the authorities of the field. In the case of minerals, the Nickel-Strunz system uses four levels:

Level	Minerological Term	NN Level	Minerological Example	NN Example
1	"Primary Groups" (there are 10)	Genus	Sulfides and Sulfosalts	*Dwsu*
2	"Series" (arbitrary number)	Species (headword)	Metal Sulfides, M: S <= 1:2	*Dwsai*
3	"Family" (arbitrary number)	Expansion genus	M:S = 1:2, with Fe, Co, Ni, PGE, etc.	*Dwsai-faisu*
4	Mineral (arbitrary number)	Expansion species	Sylvanite $(Au,Ag)_2Te_4$	*Dwsai-faihi*

In the primary family assignments (genus Dw-- words), the "Primary Groups" are distributed among the 16 species. Since the N-S system has only 10 top-level classes, each N-S class is assigned an NN genus, leaving six unassigned. Of these, one species (*Dwh-*) is assigned for general minerology concepts, and the remainder are "reserved" (unassigned). The reserved species can be used for expansion or in case of additions to the N-S top-level categories; this was done with species *Dwj-* which expands classes in species *Dwc-*, using two species to represent the numerous minerals in Nickel–Strunz class 09: Silicates and Germanates.

18.3. Nwehu Nuswei Expansion

Here we discuss the NN terminology and guidelines for expanding vocabulary.

18.3.1. NN Terminology

The main body of NN words are classified as follows, using minerals *Dw--* as an example:

1. Family: First letter, Consonant: C1. ***D***---- 'Inorganic natural phenomena'
2. Genus: Second letter, Vowel: V1. *D**w***-- 'Mineralogy'
3. Species: Third letter, Consonant: C2. *Dw**h***- 'Minerology: Principles and Concepts'
4. Word: Fourth letter, Vowel: V2. *Dwh**u*** 'Minerology, the study of minerals'

Expansion words are classified similarly; all expansion words begin with *F,* and since they always follow a headword, their letters are numbered beginning with the fifth:

1. Expansion family: Fifth letter, Consonant: C3. ***f***--- (always *f*)
2. Expansion genus: Sixth letter, Vowel: V3. *f**u***--(varies according to the expansion plan chosen)
3. Expansion species: Seventh letter, Consonant: C4. *Fu**h***- (varies according to the expansion plan chosen)
4. Expansion word: Eighth letter, Vowel, V4. *Fuh**u*** (varies according to the expansion plan chosen)

D	w	h	u	f	u	h	u
C1	V1	C2	V2	C3	V3	C4	V4

18.3.2. Expansion Plan 1

This plan was intended to ease learning and pronouncing the expansion names by echoing V2 in V3. On making the assignments, it became apparent that Plan 1 does not scale up gracefully and is limited in its ability to accommodate large numbers of techinical terms, so **it is not recommended**. However, Plan 1 is outlined here for completeness.

Examples of Plan 1:

Dwci 'Neosilicates' (N-S Primary Group, NN assigned headword);

*Dwc**i**-f**i**xu* 'Nesosilicates without additional anions; cations in tetrahedral [4] coordination' (V2 is echoed in V3, V4 *-u* (0) indicates this is the name of an N-S Family);

*Dwc**i**-f**i**xi* 'Eucryptite' (V4 *-i* (1) indicates this is the first mineral in an N-S Family; it will be incremented for each mineral in the family until it reaches 16, at which point it is reset to *-i* (1) and C4 is incremented).

Dwcei 'Sorosilicates';

*Dwcei-f**ei**hu* 'Si_2O_7 groups, without non-tetrahedral anions; cations in tetrahedral [4] coordination'

*Dwcei- f**ei**hi* 'Åkermanite'

Dwca 'Phyllosilicates';

*Dwc**a**-f**a**xu* 'Phyllosilicates with single nets of tetrahedra with 4-, 5-, (6-), and 8-membered rings';

*Dwc**a**-f**a**xi* 'Bussyite-(Y)'

Guidelines for Plan 1:

Each N-S Primary Group and Series is assigned an NN species and headword.

In Plan 1, as also in Plan 2, each expansion-species starts over with *F---* words beginning with *-fuhu*. Since Plan 1 requires the first expansion vowel to echo the last headword vowel, and the final expansion vowel begins with 1 rather than 0, Plan 1 limits expansion items per headword to 16 x 15 = 240. (Plan 2 raises this to 864,000.)

1. In each expansion genus, V3 begins with the same vowel as V2 (the final vowel of the headword); V3 remains the same within each N-S Family.
2. In each expansion genus, C4 begins with *h* (0). It is incremented either when:
   - a new expansion species is started; or
   - V4 reaches a value of -woi (16).
3. When C4 reaches a value of -*b*- (16), a new headword is generated. In the *Dwc-* genus, this was necessary for *Dwci, Dwce,* and *Dwcei*; it was done by moving all members of the Primary Group "Silicates and Germanates" whose C2 was initially assigned a value higher than -*w*- (8) to previously unassigned genus *Dwj-*. *Dwci, Dwce,* and *Dwcei* were then glossed as the first part of their N-S series, and a second part was created for each by adding 8 to C2, yielding *Dwcwi, Dwcwe,* and *Dwcwei*. This tactic (frankly, a "kluge") was adopted to preserve the central vowel of V4, creating a sound+memory link.
4. At the beginning of each expansion species, V4 is assigned -*u* (0) and represents the species as a whole
5. V4 is incremented for each new term, beginning with -*i* (1).
   - When its value reaches 16, C4 is incremented and V4 is set to -*i* (1);
   - V4 is only set to -*u* (0) when a new species is started.

18.3.3. Expansion Plan 2

Plan 2 was designed to scale up more gracefully and accommodate categories with larger numbers of terms. Any extra learning difficulty is unlikely to be significant, so this is the **recommended** explansion plan.

There is no reason why other expansion plans should not be devised and used to meet the needs of other areas' technical terminology, but this plan appears to be eminently practical.

Examples of Plan 2:

Dwse 'Sulfides and Sulfosalts' (N-S Primary Group, NN assigned headword);

Dwse-fuhu 'Sulfides and Sulfosalts with Cu, Ag, Au' (V3 starts with -*u*- (0) in each N-S Family and is incremented when C4 reaches 16; V4 -*u* (0) indicates this is the name of an N-S Family);

Dwce-fuhi 'Alburnite' (V4 -*i* (1) indicates this is the first mineral in an N-S Family; it will be incremented for each mineral in the family until it reaches 16, at which point it is reset to -*i* (1) and C4 is incremented).

Dwsa 'Metal Sulfides, M: S = 3 :4 and 2:3';

Dwsa-fuhu 'Metal Sulfides, M: S = 3 :4 and 2:3'

Dwsa- fuhi 'Bornhardtite'

Dwso 'Sulfides of arsenic, alkalies; sulfides with halide, oxide, hydroxide, H_2O';

Dwso-fuhu 'Neso-sulfarsenites, etc. without additional S';

Dwso-fuhi 'Arsiccioite'

Guidelines for Plan 2

1. In each NN expansion family, V3 begins with -*u* (0); this is incremented when the value of C4 reaches 16
2. In each expansion genus, C4 begins with -*h*- (0). It is incremented either when:
   - a new expansion species is started; or
   - V4 reaches a value of 16 and is reset to -*i*- (1).
3. At the beginning of each expansion species, V4 is assigned u (0) and represents the species as a whole.
4. V4 is incremented for each new term, beginning with i (1).
   - When its value reaches 16, C4 is incremented and V4 is set to i (1);
   - V4 is only set to u (0) when a new species is started.

Maximum capcity for each headword is 256 expansion spicies, each of which can contain up to 3375 entries totaling 864,000 terms for each headword.