

septal

temporal

unspecified

DL

IM

VM

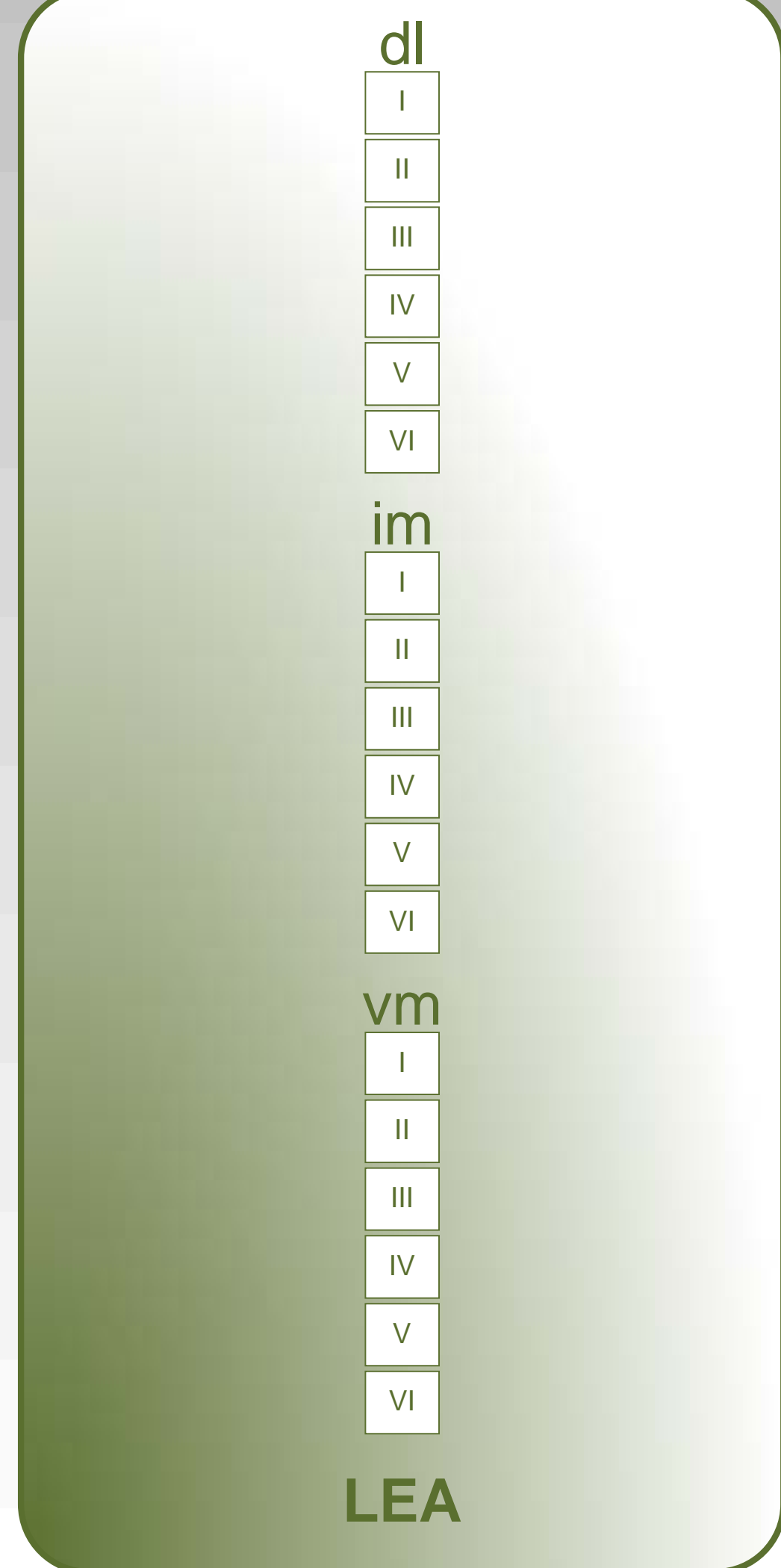
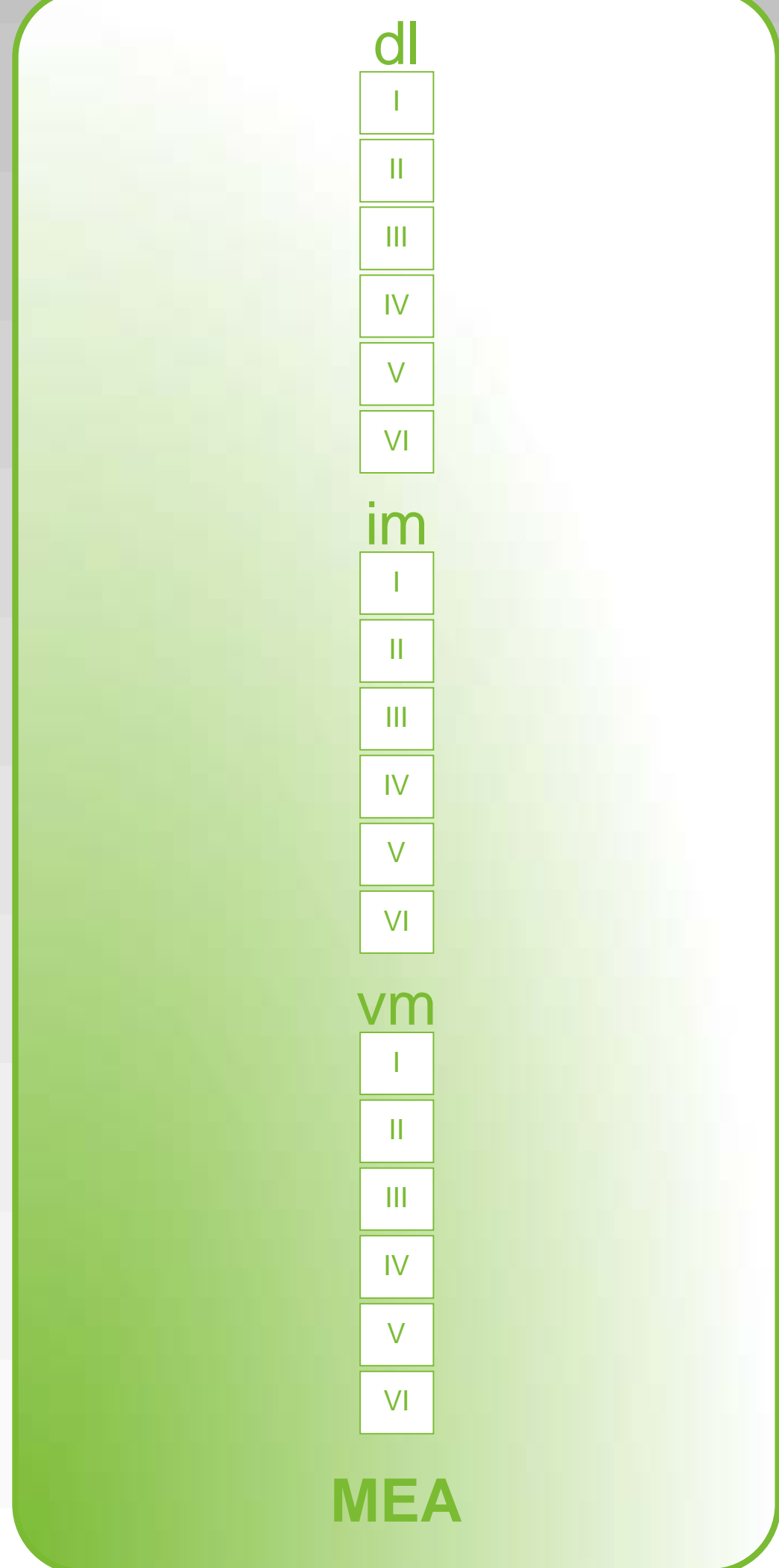
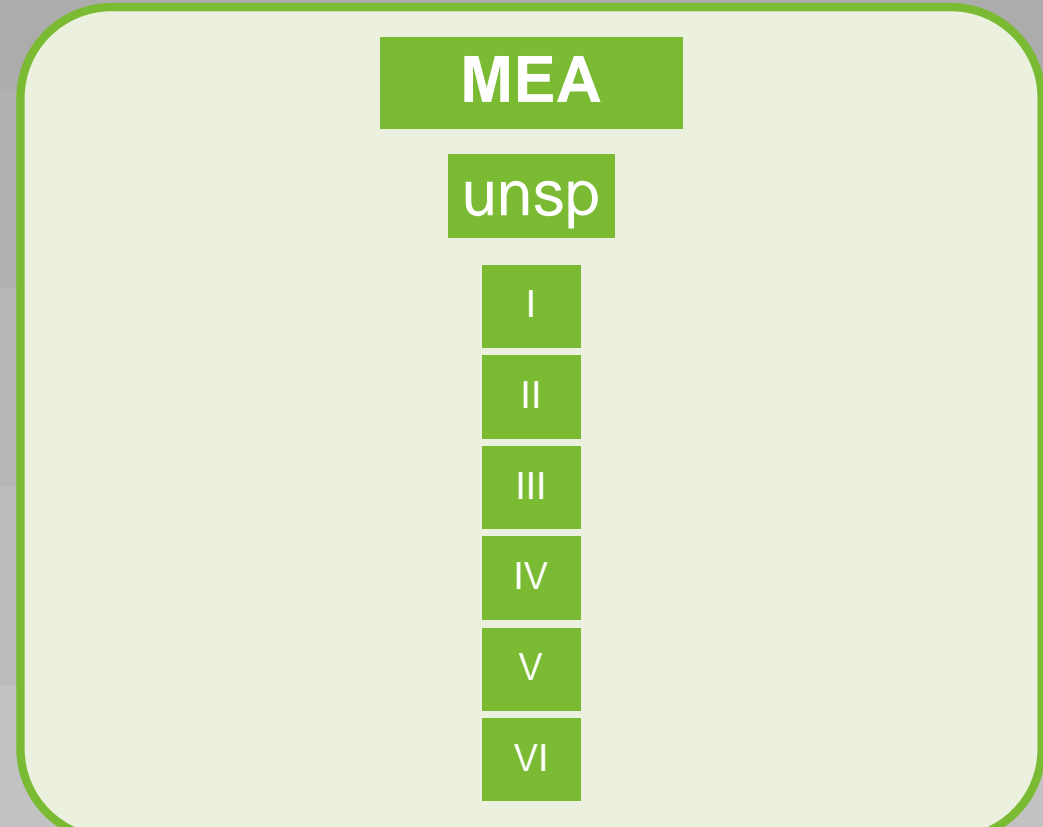
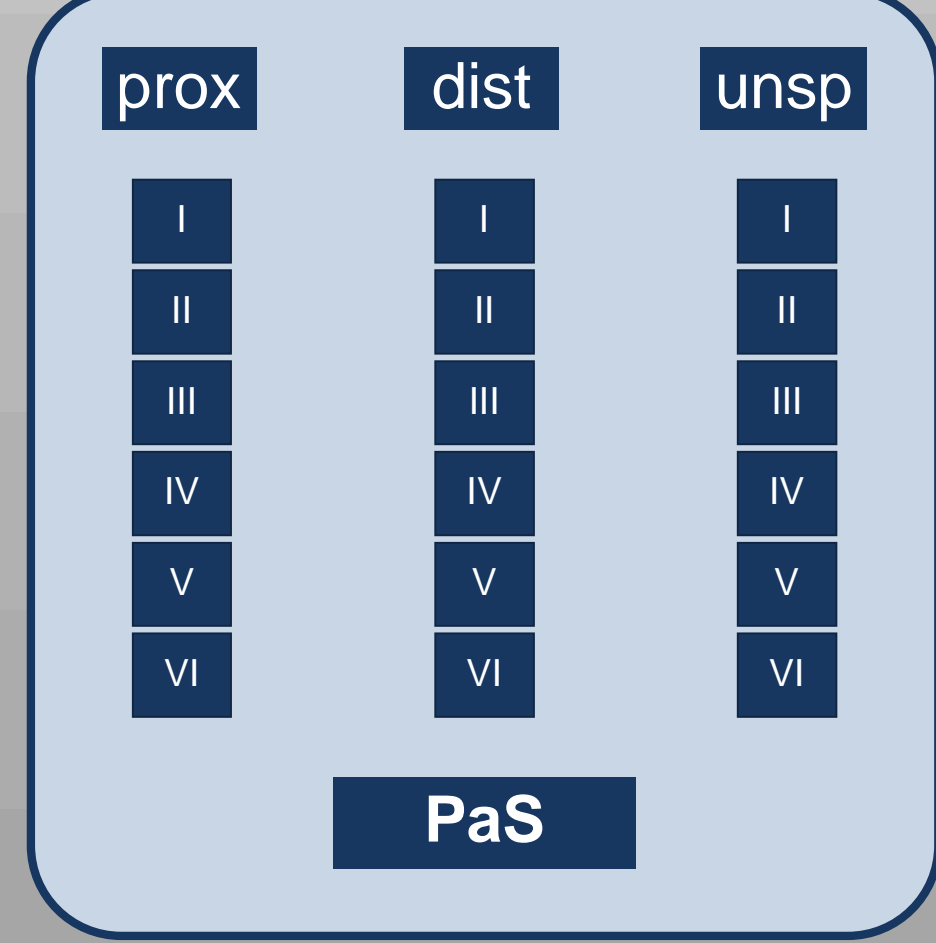
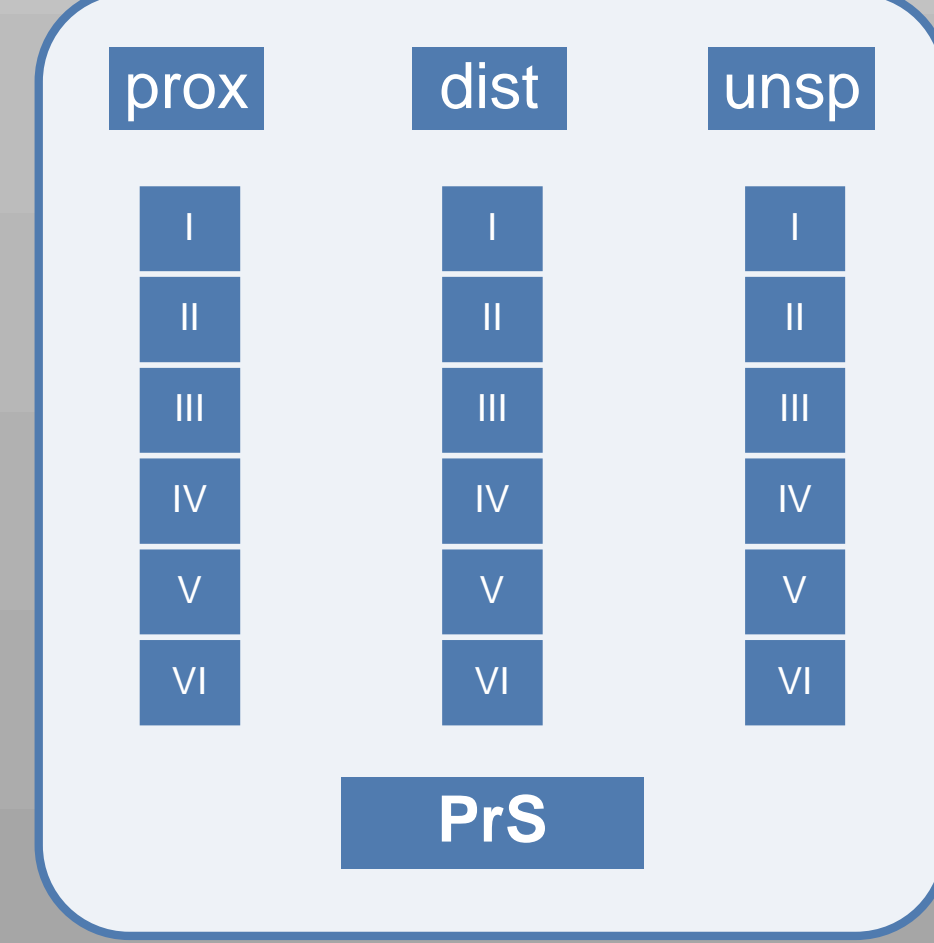
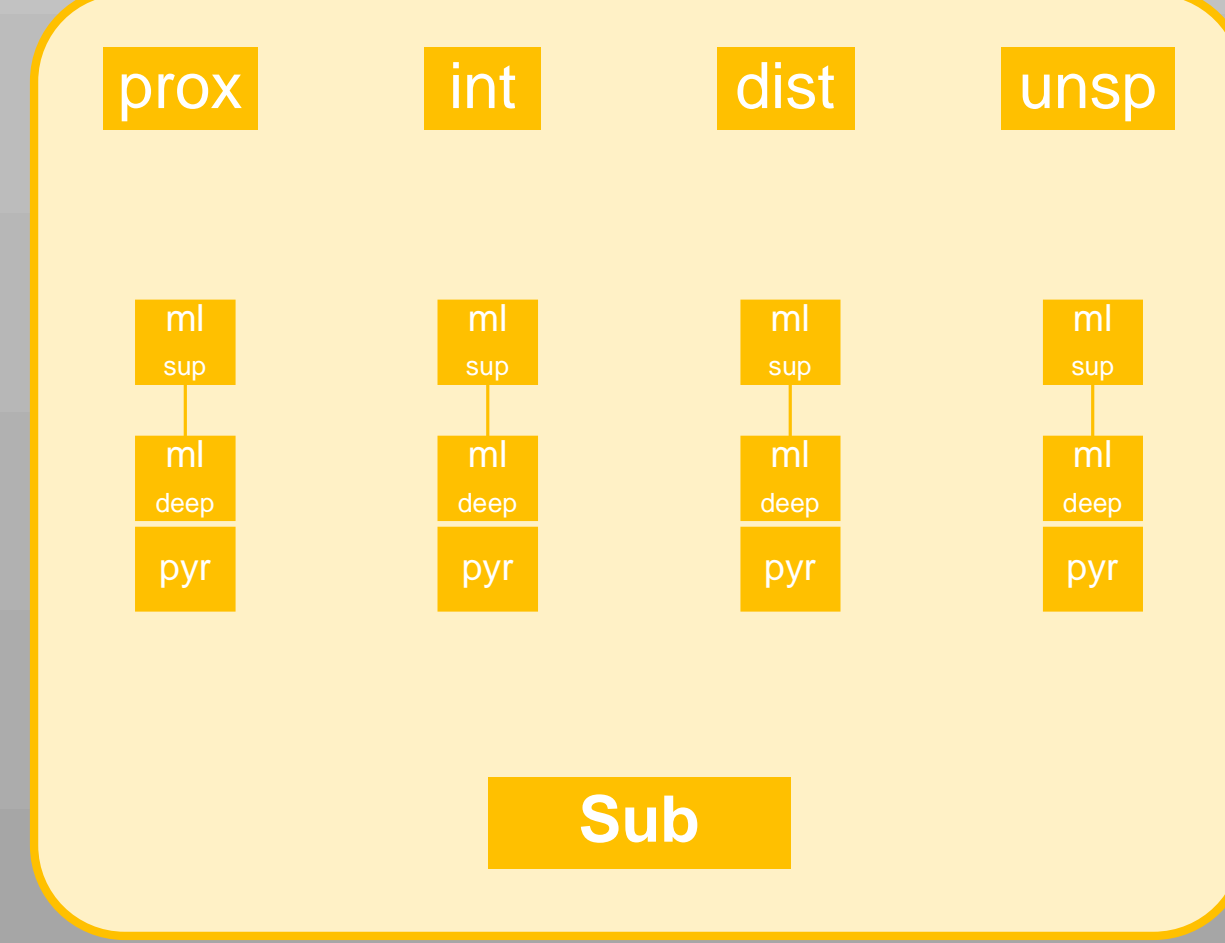
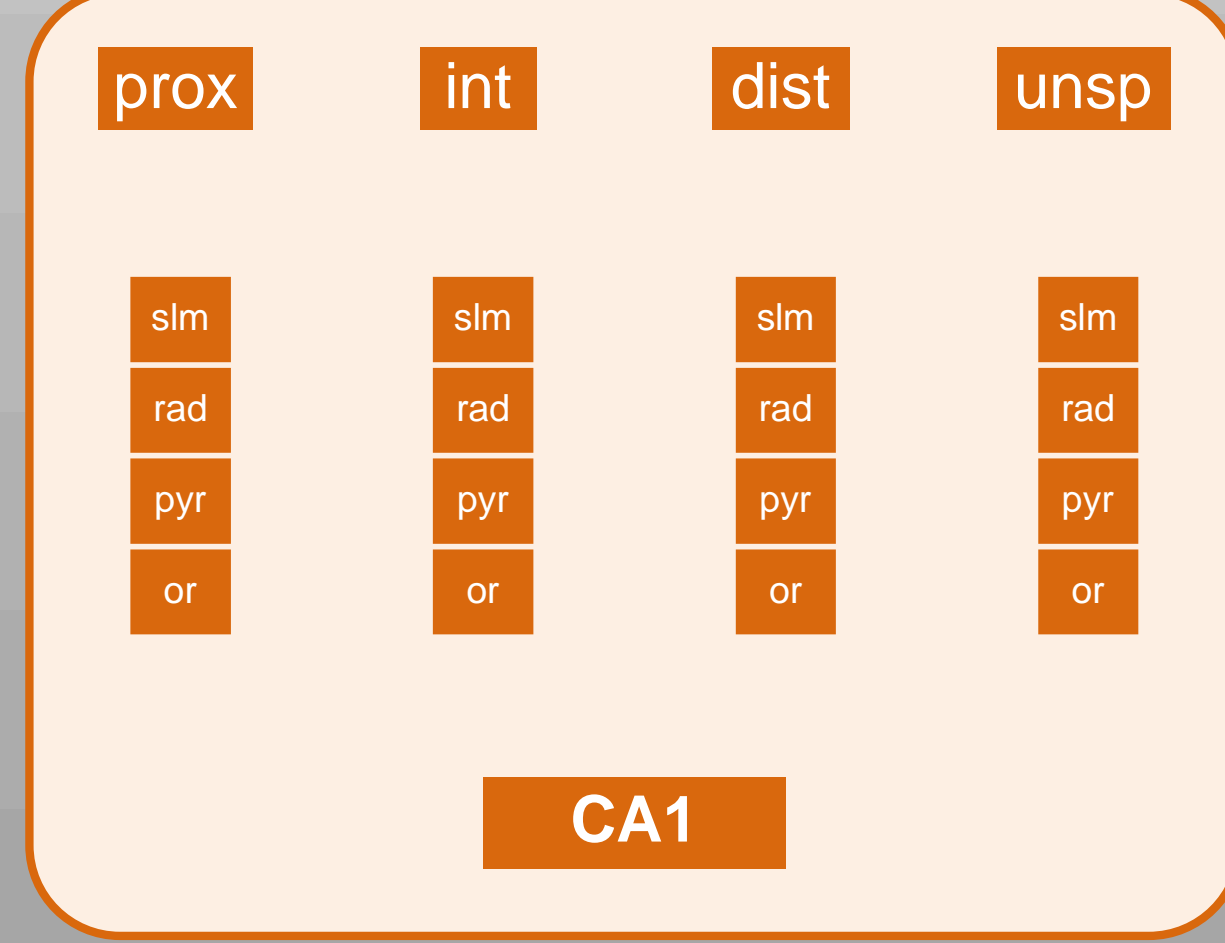
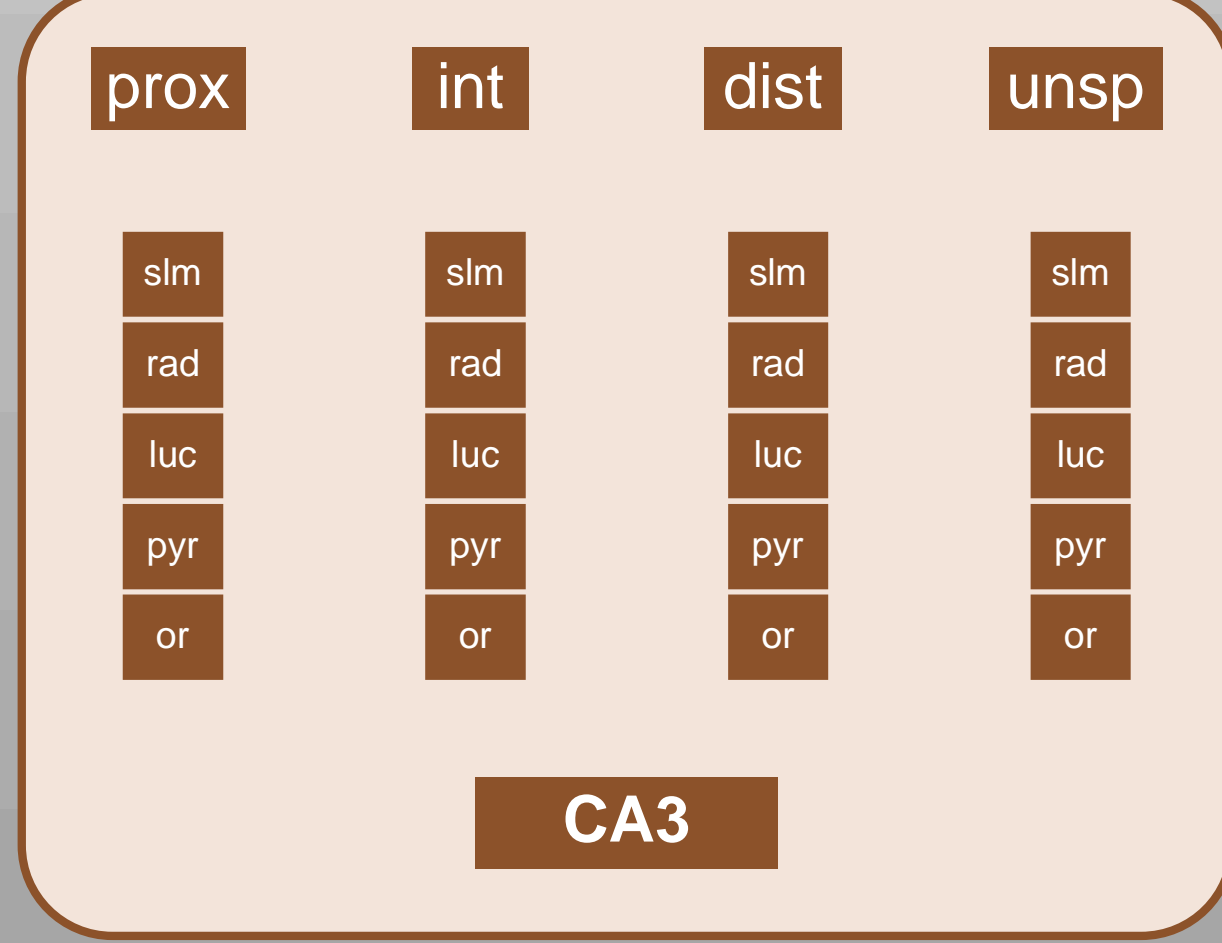
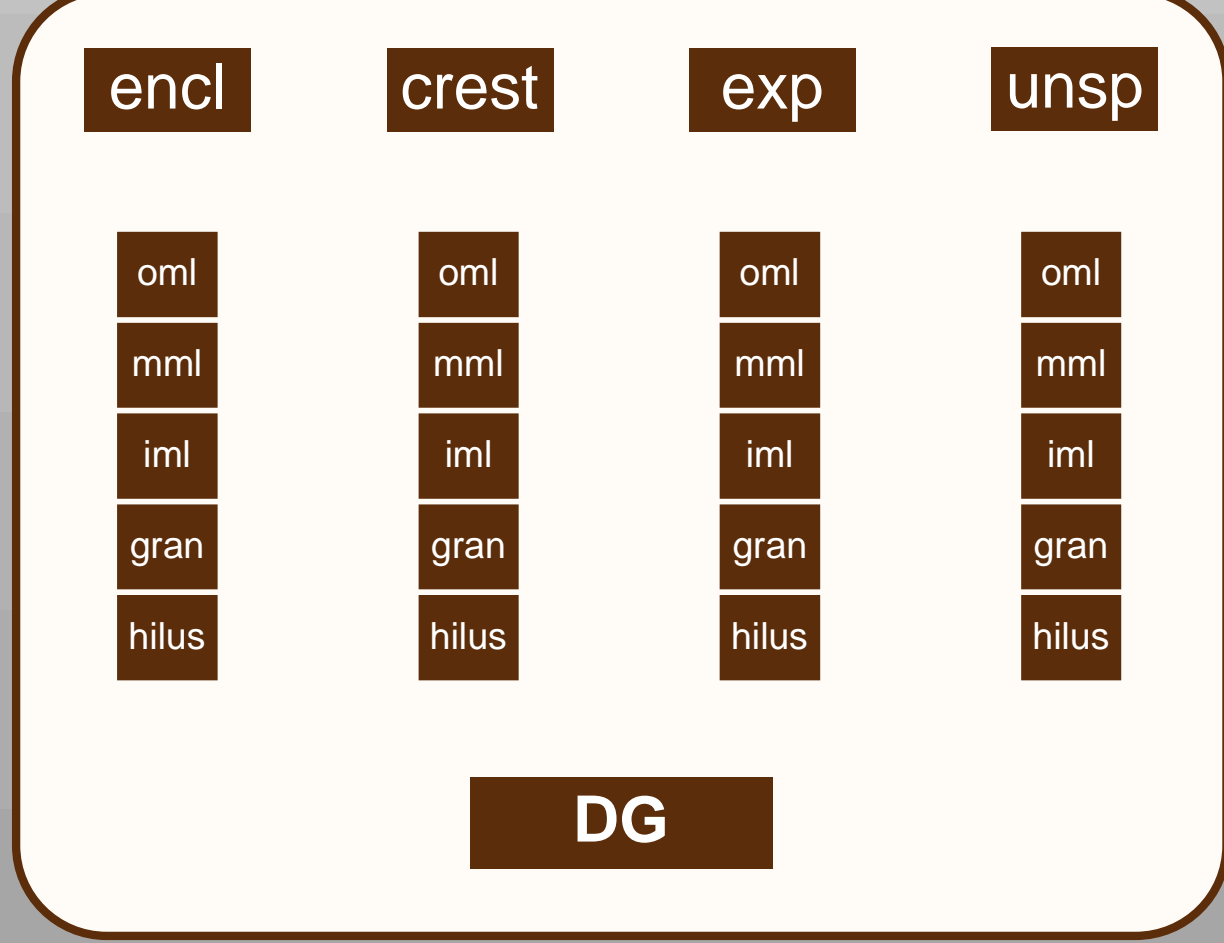
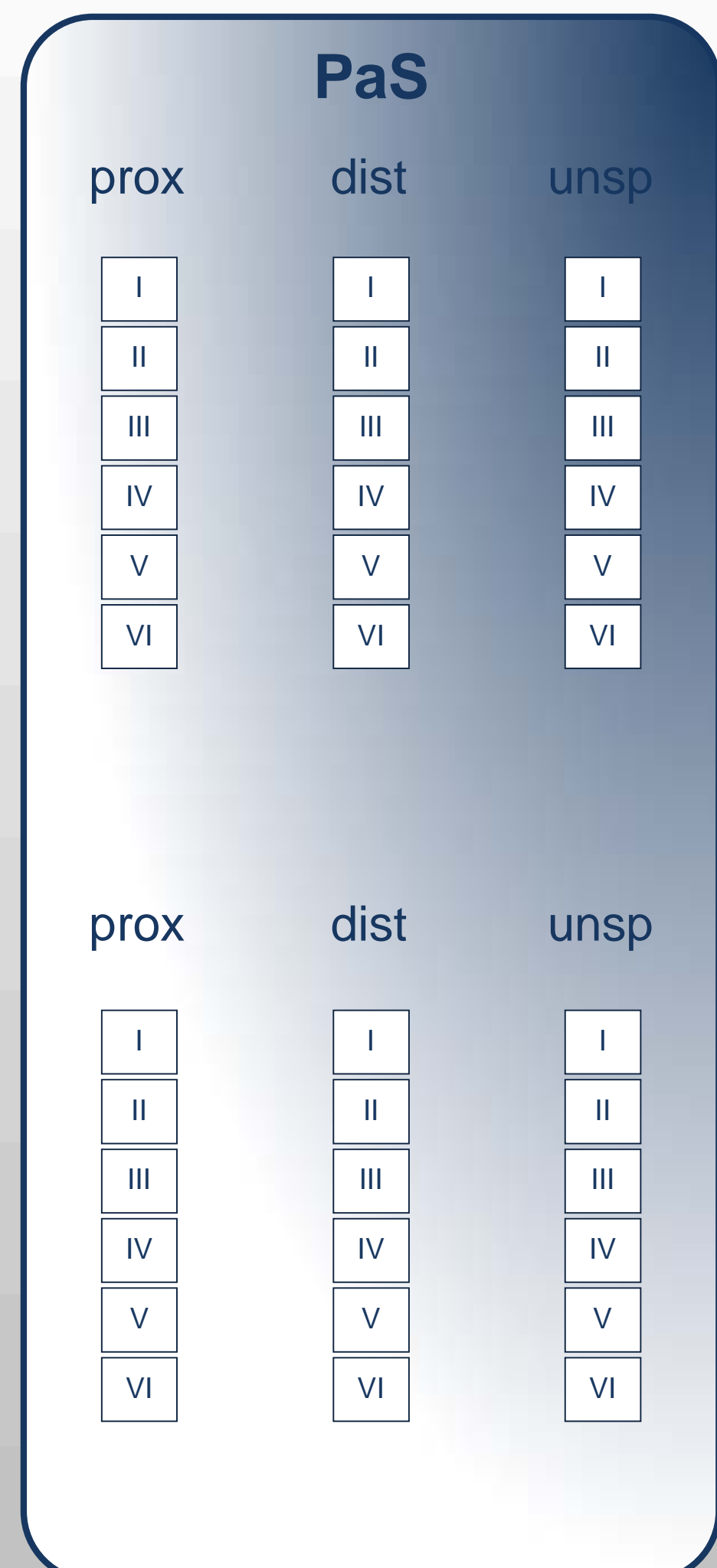
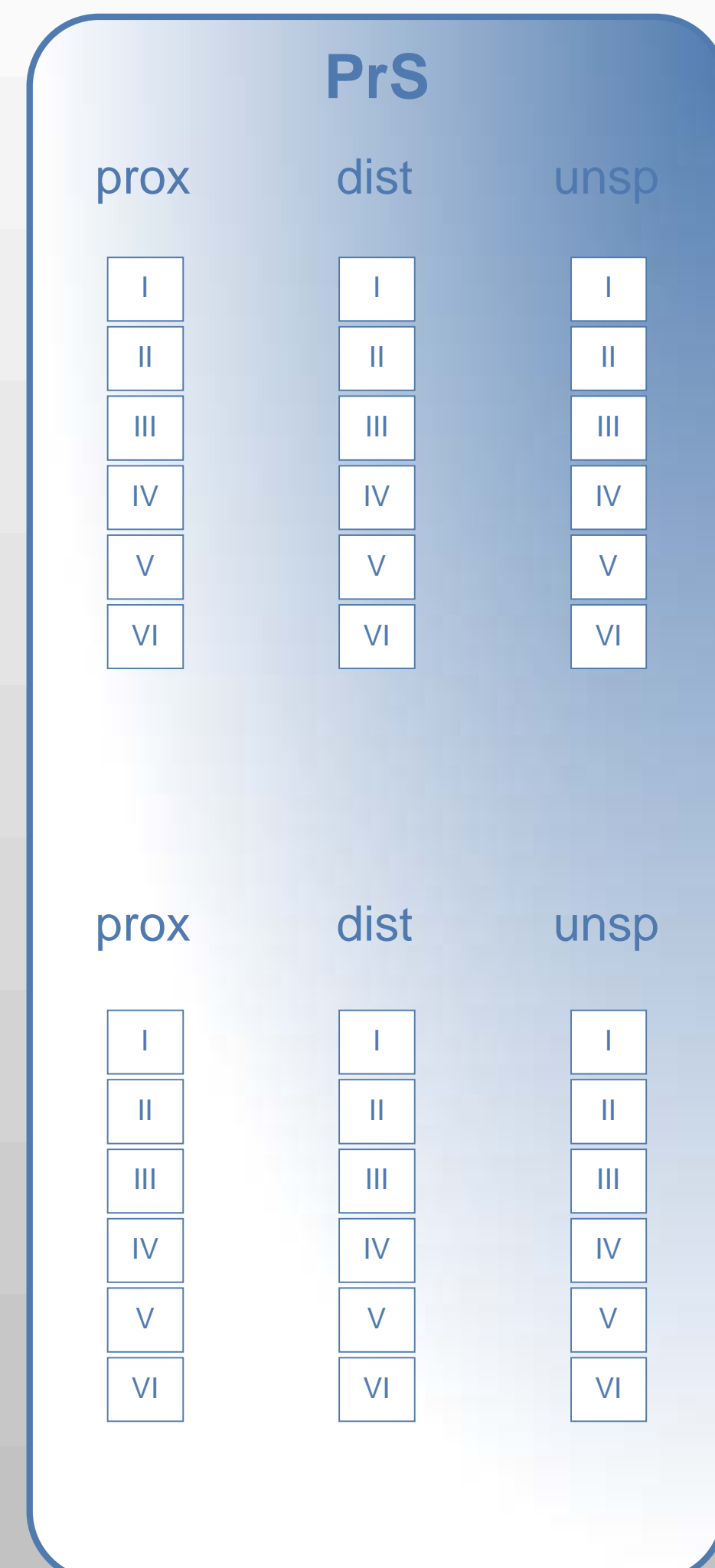
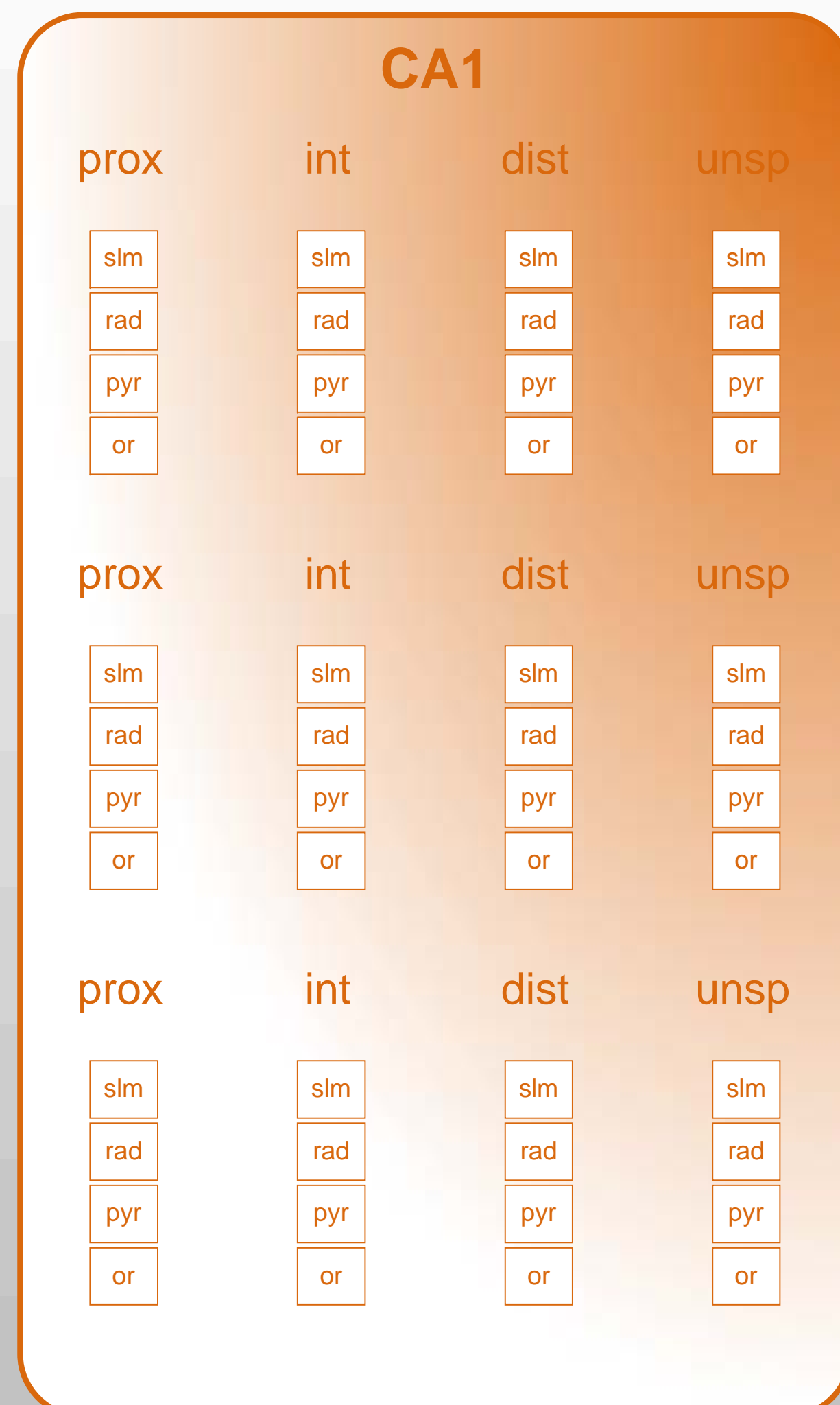
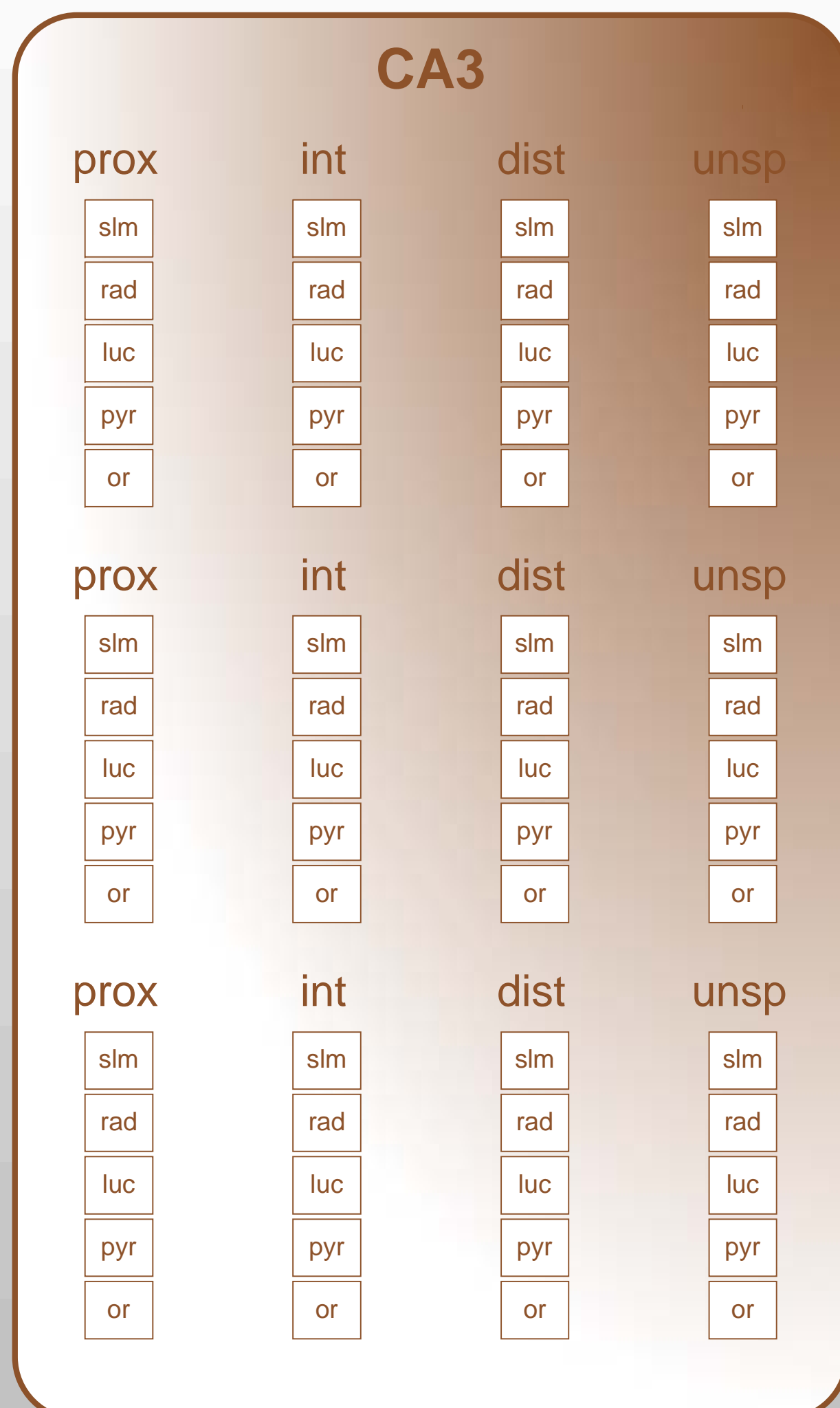
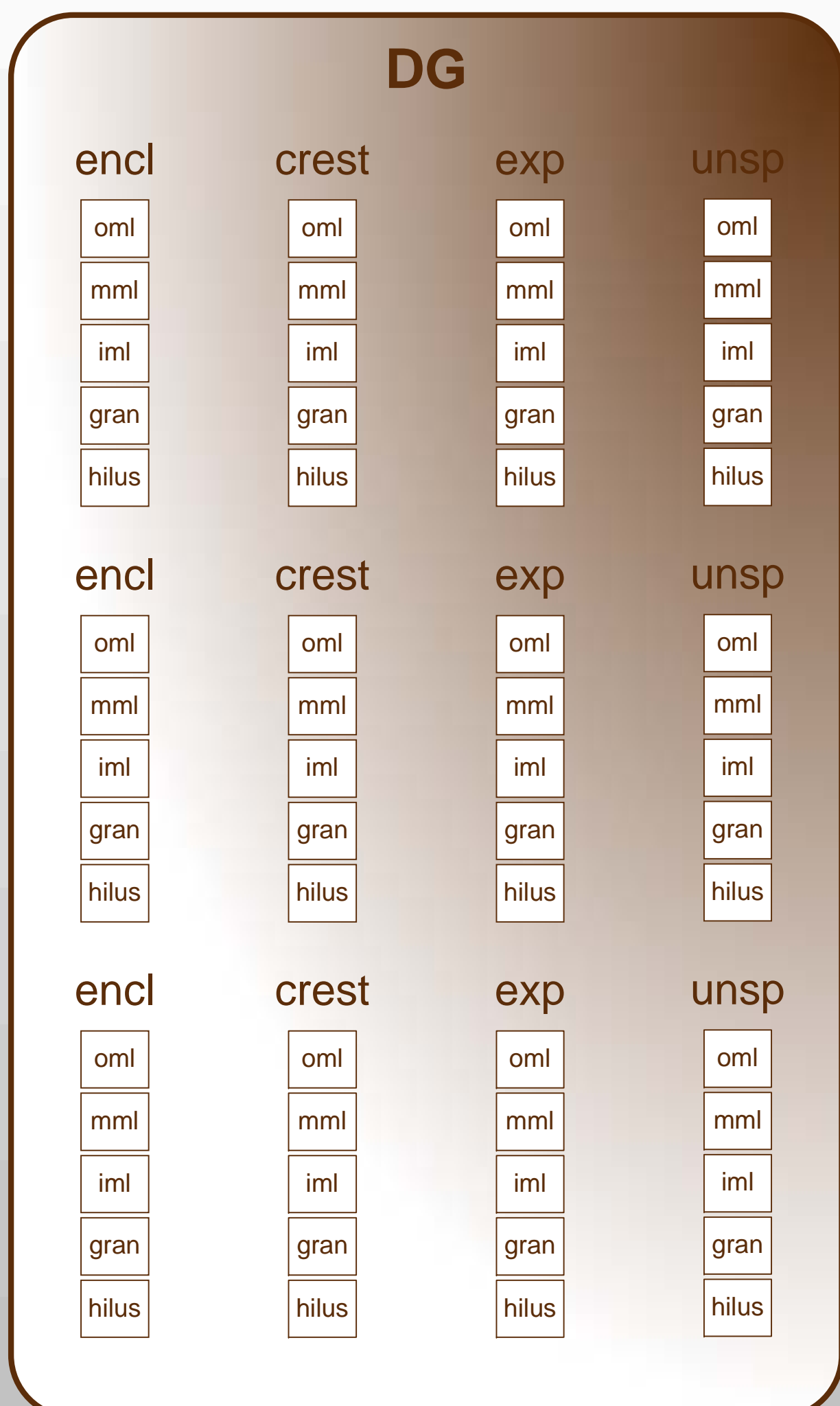
septal

temporal

unspecified

dorsal

ventral



In this diagram, we visualized the three-dimensional organization of the projection patterns between and within the hippocampal formation (HF) and parahippocampal region (PHR). All literature concerning projections of this system for the rat, was collected (see Supplement 2) and analyzed. Over the years, the nomenclature has changed and when necessary, reported results were translated into a common frame of reference (see Table 1 in Supplement 2). Subsequently, almost 1600 projections were drawn between all subdivisions of the HF and PHR, with as much topographical detail as current knowledge permits. Here, a short description of all subdivisions is provided and Figure 1 of the accompanying review displays the location of each region and its coordinate system.

Dentate Gyrus (DG)
The DG is a V-shaped structure situated in the most proximal part of the HF. DG is subdivided into the crest area, the enclosed blade, positioned adjacent to CA1 and the exposed blade and within each subregion three layers can be distinguished. In the molecular layer (*stratum moleculare*), an inner, middle and outer one-third is discerned, based on afferent connections impinging on the dendrites of the granule cells. The somas of the granule cells are situated in the granule cell layer (*stratum granulosum*). The hilus or polymorphic layer (*stratum multiforme*) is enclosed by the granule cell layer and contains a rich variety of cell types including mossy cells.

Cornu Ammonis (CA)
The CA subfield forms the area between DG and Sub. The laminar organization of CA3, CA2 and CA1 is rather similar. The principle cell layer (*stratum pyramidale*) consists of the somas of the pyramidal cells. The *stratum oriens* is located deep to the *stratum pyramidale* and contains the basal dendrites of the pyramidal cells. The apical dendrites of the pyramidal cells stretch into the *stratum radiatum* and the *stratum lacunosum moleculare*. An additional layer, the *stratum lucidum*, is located only in CA3 just superficial to the *stratum pyramidale*. The term CA4, in between the hilus and CA3 is avoided. A separate description of CA2 is not included since this is a small and under-investigated region in the rat.

Subiculum (Sub)
The Sub stretches between CA1 and the PrS. It consists of a polymorphic layer (not depicted in the diagram), a *stratum moleculare* and a broad principle cell layer with large pyramidal cells, together with a mixture of smaller interneurons. The *stratum moleculare* of the subiculum can be subdivided into a deeper portion that is continuous with the *stratum radiatum* of CA1 and a superficial portion that is continuous with the *stratum moleculare* of the PrS and *stratum lacunosum moleculare* of CA1. The *stratum pyramidale* can be divided into a deep and a superficial part. A transitional area between CA1 and the Sub, termed prosubiculum, has been distinguished by several authors. In this region, the *stratum radiatum* becomes gradually smaller and the *stratum pyramidale* broadens. The contemporary view regards the prosubiculum as the area where CA1 and Sub neurons overlap.

Prosubiculum (PrS) and Parasubiculum (PaS)
The PrS is located distally from the HF and is positioned in between the Sub and the PaS. The PrS is distinguished from the Sub by a densely packed superficial pyramidal cell layer (II/III). Similar to the EC, the PrS has a plexiform layer, *lamina dissecans* (IV), and two deep layers with pyramidal cells. The term postsubiculum was introduced by Brodmann to identify the dorsal part of the PrS. Some controversy remains about the existence of this area. In this diagram, the postsubiculum is considered as the septal (dorsal) part of the PrS. The PaS lies distal to the PrS. Layer II and III have densely packed pyramidal cells and the deep layers are continuous with the deep layers of EC.

Entorhinal Cortex (EC)
The EC forms the ventroposterior part of the rat cerebral hemisphere and is bordered medially largely by the PaS and dorsolaterally by the POR and PER. The EC consists of six layers, four cell layers (II, III, V and VI) and two plexiform layers (I, IV or lamina dissecans). Two subdivisions are generally recognized; a medial (MEA) and a lateral part (LEA).

Perirhinal (PER) and Postirhinal (POR) cortex
The PER and POR are situated dorsally along the rhinal fissure. Both consist of six cell layers. The PER consist of two subdivisions, the agranular area 35 (A35) and the dysgranular area 36 (A36) or ectorial cortex. POR consists of a ventral agranular and dorsal (dys)granular region. The rostral border of POR with PER is difficult to discern. The ventral part of POR is quite similar to A35, but the presence of ectopic layer II cells makes it possible to discriminate the region. In the PER and POR, layer IV is variably developed.

When using the diagram, it is important to be aware of its limitations.
1. Minor differences between rat strains or gender have been reported which we did not take into account.
2. It should also be noted that unlike their natural occurrence, all connections in the diagram appear to be of equal strength.
3. Lastly, the diagram does not distinguish between excitatory, inhibitory, or modulatory connections.

This diagram comes with several electronic supplements, all of which can be downloaded from the Nature Reviews Neuroscience website or www.temporal-lobe.com.
- a user manual
- a references table, which allows to find references for a particular connection
- a complete list of all references that were used to create the diagram

Please cite the accompanying NRN review if you use this diagram for your scientific work.

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