Gender-sexuality math

The underlying idea is that your gender-sexuality can be conveniently quantified/described by a vector in 3D space.

Let us first discuss gender. We define a vector $\vec{g}$ with three components (g_m, g_f, g_a) in $\mathbb{R}^3_{\geq 0}$ space. The g_m quantifies male gender component of your identity/expression, g_f is your female gender component of your identity/expression and g_a is your agender component of your identity/expression (it is up to you if you wish to describe your identity or expression with this vector). Male and female genders as two base vectors seem to be a very natural choice since these come to be quite central and commonly used concepts in our society. The assumption that those vectors are truly orthogonal may be debated but here we will assume so (as most of society also does). Then the third direction perpendicular to the binary plane is necessary to describe expression/identity that doesn't fit into this binary (you might argue here why don't I call it the nonbinary expression then but you will understand shortly). It is up to debate if such truly separate expression that cannot be reduced to a combination of fem/masc exists but in this work we assume that it indeed does (and it is certainly does exist in terms of identity).

Now about how do different gender space areas relate to the commonly used concepts. Two obvious cases are when the gender vector is along one of the binary axes: $(g_m > 0, 0, 0)$ is boy/man and $(0, g_f > 0, 0)$ is girl/woman. All the space outside these axes is nonbinarity, hence condition for it is:

$$g_m g_f + g_f g_a + g_m g_a + g_a^2 > 0 \tag{1}$$

The $(0, 0, g_a \geq 0)$ is then agender person. I logically included the $(0, 0, 0)$ case there as well but I think it is purely theoretical and on practice is unachievable. The $(g_m > 0, g_f > 0, 0)$ is bigender. The $(g_m > 0, 0, g_a > 0)$ and $(0, g_f > 0, g_a > 0)$ are demiboy and demigirl, respectively. To get cis and trans we need to introduce assigned-at-birth vector $\vec{g}_{aab}$ which can logically be only $(1, 0, 0)$ or $(0, 1, 0)$. Then if the normalised dot product of the two:

$$\frac{\vec{g} \cdot \vec{g}_{aab}}{|\vec{g}|} = \frac{g_m g_{m,aab} + g_f g_{f,aab}}{\sqrt{g_m^2 + g_f^2 + g_a^2}} \tag{2}$$

If it is equal 1, then you are cis. If it is less, you are trans. The norm (we will assume standard Euclidian) of the vector $|\vec{g}|$ represents overall gender expression. That is a bit hard to quantify without defining some standard or reference and can be scaled to the readers taste. However, if we assume that gender expression is finite, we can always normalise the space so $|\vec{g}| \leq 1$. The cases of $g_f = 1$ and $g_m = 1$ we can then rightfully call hyperfem and hypermasc, respectfully.

The very same thing now can be done for sexual and romantic attractions. Historically sexuality has been described through terms relative to gender such as hetero- and homosexual since one is considered the norm and the other to be oppressed and vilified (for reasons beyond the scope of this work). However, the terms make sense only in the context of the binary since what is hetero and homo to nonbinary? The current consensus is that with nonbinary everything is gay since the goal of distinction is to emphasise the marginalised status which nonbinarity has by default. But it is not useful in any other sense. Henceforth, I suggest an absolute coordinate system instead of relative. However, since we have three directions of gender expression and asexuality/aromanticism it must be a $\mathbb{R}^4_{\geq 0}$ space with $\vec{s} = (s_m, s_f, s_{ag}, s_a)$ and $\vec{r} = (r_m, r_f, r_{ag}, r_a)$.

Again, how does it relate to common terms? I will describe all for sexuality space only, as for romantic attraction it is the identical, just change "sexual" to "romantic". The $(s_m > 0, 0, 0, 0)$ and $(0, s_f > 0, 0, 0)$ are monosexualities (mascsexuality and femsexuality), which actually aren't common terms but whatever. The $(0, 0, s_{ag} > 0, 0)$ I don't know how to describe other than gay (imagine, a guy who is attracted only to enbies...). If at least two of the components are non-zero but $s_a = 0$, it is bisexuality. Non-zero s_a component gives you demisexuality. And finally $(0, 0, 0, s_a > 0)$ is asexuality. I choose to make asexuality a whole separate axis because it is not the same as libido which is represented by the vector's norm $|\vec{s}| = \sqrt{s_m^2 + s_f^2 + s_{ag}^2 + s_a^2}$. You can still feel horny but not attracted by anyone in particular!! For romance space the name for the norm is still open for discussion but I suggest the term "yearning". Again, hard to quantify without the standard unit, decide how you feel yourselves.

Now, as we defined all three spaces, we can also define interactions between them and link to common terms. The dot product of gender and sexuality:

$$\vec{s} \cdot \vec{g} = s_m g_m + s_f g_f + s_{ag}^2 + s_a^2 + g_a^2 \tag{3}$$

is essentially the gayness metric as it is zero only if you are hetero. If we add it with transness metric:

$$\vec{s} \cdot \vec{g} + \left(1 - \frac{\vec{g} \cdot \vec{g}_{aab}}{|\vec{g}|}\right) > 0 \tag{4}$$

means you are queer.