

1. SKETCH OF HOW TO THINK EQUIVARIANTLY

Let \mathcal{V} be as usual, $G\mathcal{V}$ the category of G -objects in \mathcal{V} with its induced symmetric monoidal structure, denoting $\mathcal{V}_G(X, Y)$ the object in $G\mathcal{V}$ given by $\mathcal{V}(X, Y)$ with its conjugation action by the discrete group G . This will be a formal toy model. We will later want \mathcal{V} to be a good category of spectra, $G\mathcal{V}$ to be a good category of G -spectra enriched over \mathcal{V} (and not literally of the form $G\mathcal{V}$).

We can apply our general theory to $G\mathcal{V}$, viewed as enriched over \mathcal{V} via the hom objects $\mathcal{V}_G(X, Y)^G$ in \mathcal{V} . In fact, we can start over with any \mathcal{V} -enriched \mathcal{M} and form $G\mathcal{M}$ and \mathcal{M}_G analogously, enriched over \mathcal{V} and $G\mathcal{V}$ respectively. Let $G\mathcal{D}[full]$ be an appropriate full subcategory of $G\mathcal{M}$, enriched over \mathcal{V} via the $\mathcal{M}_G(X, Y)^G$ and let $\mathcal{D}_G[full]$ denote the corresponding full subcategory of \mathcal{M}_G , enriched over $G\mathcal{V}$ via the hom objects $\mathcal{M}_G(X, Y)$. We give meaning to the following diagrammatic road map, which is written on the level of ordinary model categories.

$$\begin{array}{ccccc}
 G\mathcal{M}_0 & \xrightleftharpoons[\mathbb{U}]{\mathbb{T}} & \mathcal{P}(G\mathcal{D}[full], \mathcal{V})_0 & \xrightleftharpoons[\text{(-)}^G]{\varepsilon^*} & \mathcal{P}_G(\mathcal{D}_G[full], G\mathcal{V})_0 \\
 & & & & \delta^* \downarrow \uparrow \delta^\# \\
 \mathcal{P}(G\mathcal{D}[disc], \mathcal{V}_0) & \xrightleftharpoons[\text{(-)}^G]{\varepsilon^*} & \mathcal{P}_G(\mathcal{D}_G[disc], G\mathcal{V}_0) & \xleftarrow{\cong} & \mathcal{P}_G(S_G[\mathcal{D}_G[disc]], G\mathcal{V})_0
 \end{array}$$

Step 1.1. *Prove an enriched Quillen equivalence between $G\mathcal{M}$ and $\mathcal{P}(G\mathcal{D}[full], \mathcal{V})$.*

This we already know how to do: our general theory applies.

Step 1.2. *Prove a Quillen equivalence (probably enriched over \mathcal{V} but that's gravy) between the underlying categories of $\mathcal{P}(G\mathcal{D}[full], \mathcal{V})$ and $\mathcal{P}_G(\mathcal{D}_G[full], G\mathcal{V})$.*

If $\varepsilon: G \rightarrow e$, then ε^* is pullback and assigns trivial action of G to objects of \mathcal{V} . Its right adjoint is $(-)^G$. We use $(-)^G$ to create a model structure on $\mathcal{P}_G(\mathcal{D}_G[full], G\mathcal{V})_0$. It perhaps requires special good properties of the fixed point functor, but this too we know how to do in principle. It really depends only on \mathcal{V} , not \mathcal{M} : we could start with any pair $(\mathcal{D}_G, G\mathcal{D})$. Since $\eta: X \rightarrow (\varepsilon^*X)^G$ is the identity in our current formal context, this will certainly be a Quillen equivalence. NO: ε^* is not defined on presheaves! However, $(-)^G$ is fine. Alternative prolongation construction?

Step 1.3. *Find a discrete G -category $\mathcal{D}_G[disc]$ with G -fixed point category $G\mathcal{D}[disc]$ together with a G -equivalence $\mathcal{D}_G[disc] \rightarrow \mathcal{D}_G[full]$. Then use it to construct an enriched Quillen equivalence between $\mathcal{P}_G(\mathcal{D}_G[full], G\mathcal{V})$ and $\mathcal{P}_G(S_G[\mathcal{D}_G[disc]], G\mathcal{V})$.*

The first part should be the hard part, and in the G -spectrum case it is the thing that we have been looking for in terms of transfers on the one hand and our understanding of $F_G(X, Y)$ for orbit G -spectra X and Y , or really, for any G -spectra $\Sigma_G \Sigma^\infty(K)_+$, where K is a G -set, on the other hand. Obviously, in general the answer depends on the initial choice of \mathcal{M} . In our G -spectrum case, it is “only” a case of finding a good description of $(\mathcal{D}_G, G\mathcal{D})$ and a map δ . We know that it is there morally from our understanding of the G -homotopy types of the $F_G(\bar{K}, \bar{L})$, where $\bar{K} = \Sigma_G^\infty(K_+) = S_G[K_+]$ for a finite G -set K : they are $S_G[(K \times L)_+]$.

Step 1.4. *Prove that $\mathcal{P}_G(S_G[\mathcal{D}_G[disc]], G\mathcal{V})_0$ is isomorphic as a model category to $\mathcal{P}_G(\mathcal{D}_G[disc], G\mathcal{V}_0)$.*

This should be the same as we saw in general, in the nonequivariant context. The notation \mathcal{P}_G is really more for emphasis than for mathematics. Again, this should be a general argument, independent of \mathcal{M} .

Step 1.5. *Prove a Quillen equivalence (no enrichment) between $\mathcal{P}_G(\mathcal{D}_G[disc], G\mathcal{V}_0)$ and $\mathcal{P}(G\mathcal{D}[disc], \mathcal{V}_0)$.*

This should be essentially the same as Step 1.2, but perhaps simpler, and again general, independent of \mathcal{M} . As a test of sanity, we should make sure that this program works trivially when $\mathcal{M} = \mathcal{V} = \mathcal{U}$ and $G\mathcal{D} = G\mathcal{O}$; \mathcal{O}_G will have orbits and set maps between them, with G acting by conjugation.