Action operads comments to fix

1. Introduction

•

2. Action operads

- I put in G0abel (2.3.8) to prove, and we should put in a proof that all the π's are surjective or trivial (2.3.4)
- I have been changing tensor product to block sum for a lot of things, we need to go through and decide how to do that consistently

3. Operads in the category of categories

- Start of 3.1: Should the 2-monad should have $EP(n)$? Compare with 3.3.9.
- Defn 3.3.7 of cocomplete symmetric monoidal cat
- After 3.3.9 seems repetitive (essentially description of $\underline{P}$)
- Prop 3.3.16 The proofs need filling out
- Should we change $E\Lambda(n) \times X^n/\Lambda(n)$ to be $(E\Lambda(n) \times X^n)/\Lambda(n)$?

4. Monoidal structures and multicategories

- Intro
- Use

  `\lmc`

  for lambda monoidal categories
- Theorem 4.2.11: 'Define β by' should have $s_{p_1+r_1,q_1+r_1}$ on the RHS, not s_{p_1,q_1}?
- Lemma 4.3.2: Needs rewording. Is the *underlying set of the free monoid*?
- Prop 4.3.3: Is $im(\pi)$ defined? What is the underlying permutation operad? Does this mean the symmetrized operad?
- an $E\Lambda$ or a Λ-monoidal
- Lemma 4.3.5: Spacing of equations needs fixing.
- $\Lambda(2)$ not $G(2)$
- What is an action morphism?
- Include the extra steps in the first equations and finish with a period.
- Get rid of *we're*
- Make sure sentences around here are finished with a period.
- Remove $\cdot$ and $\circ$ where not used elsewhere
- Rewrite equations at the end of the proof (spacing and add some words)
- Change the word 'finally'
- Change 'a bit of new terminology'
- Do we want another notation to emphasise the underlying monoid?
- 'Then we will also *use*'
- Lemma 4.3.8: Should be a $\Lambda(n)$, not just Λ.
- Λ not G
- Spacing of α and extra couple of steps?
- Defn 4.4.3: Check spacing of the strength maps with subscripts

- Remark 4.4.4: It's mostly described but not directly shown about the strength axioms?
- Change sentence to be *further* notation
- Theorem 4.4.5: overfull hbox on second page of proof
- Spacing of labels on arrows needs looking at
- Corollary 4.4.6: Still don't like the terminology 'non-symmetric'. Is 'plain' operad better?
- Defn 4.5.1: Odd mix of α and g. Think something is mixed up here. $(- \cdot \alpha)$

5. Invertible objects

- The notation in the very first sentence needs to be explained somewhere!
- Rewrite intro: Need to explain that the goal is to understand some group actions
- Decide on ELambda algebras or Lambda monoidal categories throughout (we decided the second!)
- New notation: added earlier (line 905, search beta_to_oplus), just need to implement, search for action maps or superscript tensors
- Fix weakly invertible section

Leftover fixes that I'm not sure about:

- Move comment (QQQ)
- Fix paragraph; make clear we are determining composition
- Explain M strategy, include forward refs

6. Invertibility and group actions

- I want to write $\Lambda^{\oplus}$ for the underlying monoid maybe??
- **why? This one involves real math**
- not happy with last section

7. Computing automorphisms of the unit

- 4.1.3 check 2.3.10: need to make sure this is in an earlier section, and ref'ed
- explain purpose
- improve proof 4.2.3
- check commutative Square
- redo 4.4
- insert diagram
- consistent text after 4.5.3
- move something to earlier
- highlight that star means the inverse under tensor product for morphisms
- check the note

8. a full description of L_n

- Think about n vs 2n in AGndef
- check reference
- rewrite calculation
- check universal property
- insert for a simple example

9. Examples

- Actually read this section, fix anything

Comments addressed

10. Invertible objects

- Include notation for η as the unit here
- Change to equalizers
- Change to $(LX)_{inv} = LX$
- Fix ()s
- Include triangle NO
- Uniform gp superscripts
- Remove actually
- Ref η
- Replace with is, remove parts
- Remove proof
- Fix ab superscripts, same as gp
- qi
- Under red line: move? make remark? delete some?
- Where do we say this?
- Need 2-adjunction: this should follow from Thm 8.6 in the enriched_sketches paper I saved
- include forward ref to where we use crefepi: I can't find it
- Get better Eckmann-Hilton ref: don't care anymore

11. Invertibility and group actions

- Forward ref
- definition env
- little wording fixes
- change G to Lambda
- S vs Sigma for symmetric groups: I picked Sigma
- Think about free monoid lem again
- Fix triangle
- lots of notation issues (e, G, length bars)
- why splitting
- missing ref?
- splits by construction: hmm
- ref?
- for v, v' not delta of something
- inverses for morphisms under comp vs tensor
- more G's (x2)
- another missing ref
- another G
- include corollary?
- forward refs
- practical?

12. Computing automorphisms of the unit

- in the next two results

- 4.1.2 two boxes
- the above following square
- insert =
- check 4n or 2n (it is correct in 7.2.1)
- mentioned Delta, I
- fixed proof 4.3.2
- remove functor
- isomorphism symbol
- clarify this
- make sure length and size notation is introduced earlier
- bad line break at the beginning of 4.5
- change prove to shows
- bad line break
- insert the proof from Ed's email
- put a short proof
- change express to describe
- isomorphism symbol
- change make sure to ensures
- remove calculation
- change we want to do

13. A full description of L_n

- bad line break
- remove exposition
- fix fancy G
- change G to lambda
- isomorphism symbol
- tensor product given component wise
-

14. Examples

-