



Results of the variability studies in and between the cotton bales produced in Africa

Résultats des études de variabilité au sein et entre les balles de coton produites en Afrique

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Arusha, January 2012



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Plan of presentation

Plan de présentation



- Within-bale variability
- Between bales variability
- Next steps
- Conclusion
- Variabilité intra-balle
- Variabilité inter-balles
- Prochaines étapes
- Conclusion



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- Within-bale variability
 - Between bales variability
 - Next steps
 - Conclusion
 - First: how did we come to these studies?
- Variabilité intra-balle
 - Variabilité inter-balles
 - Prochaines étapes
 - Conclusion
 - En premier : pour quelle(s) raison(s) ces études

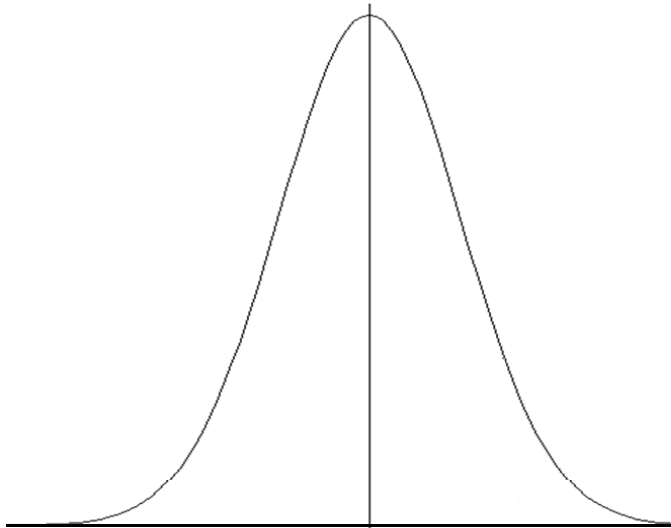


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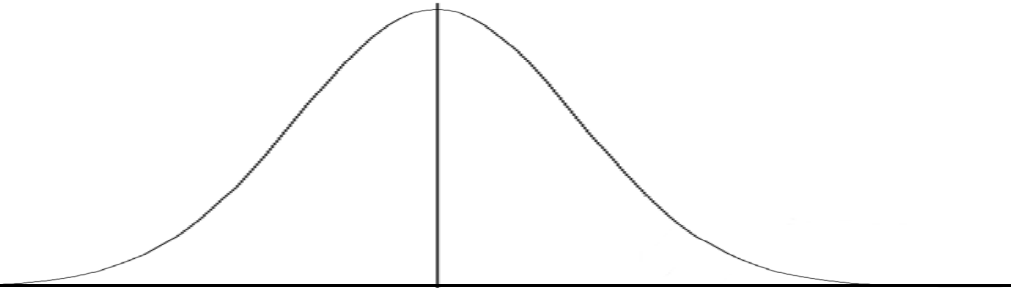
Results are more or less variable Les résultats sont + ou - variables



Lower variability



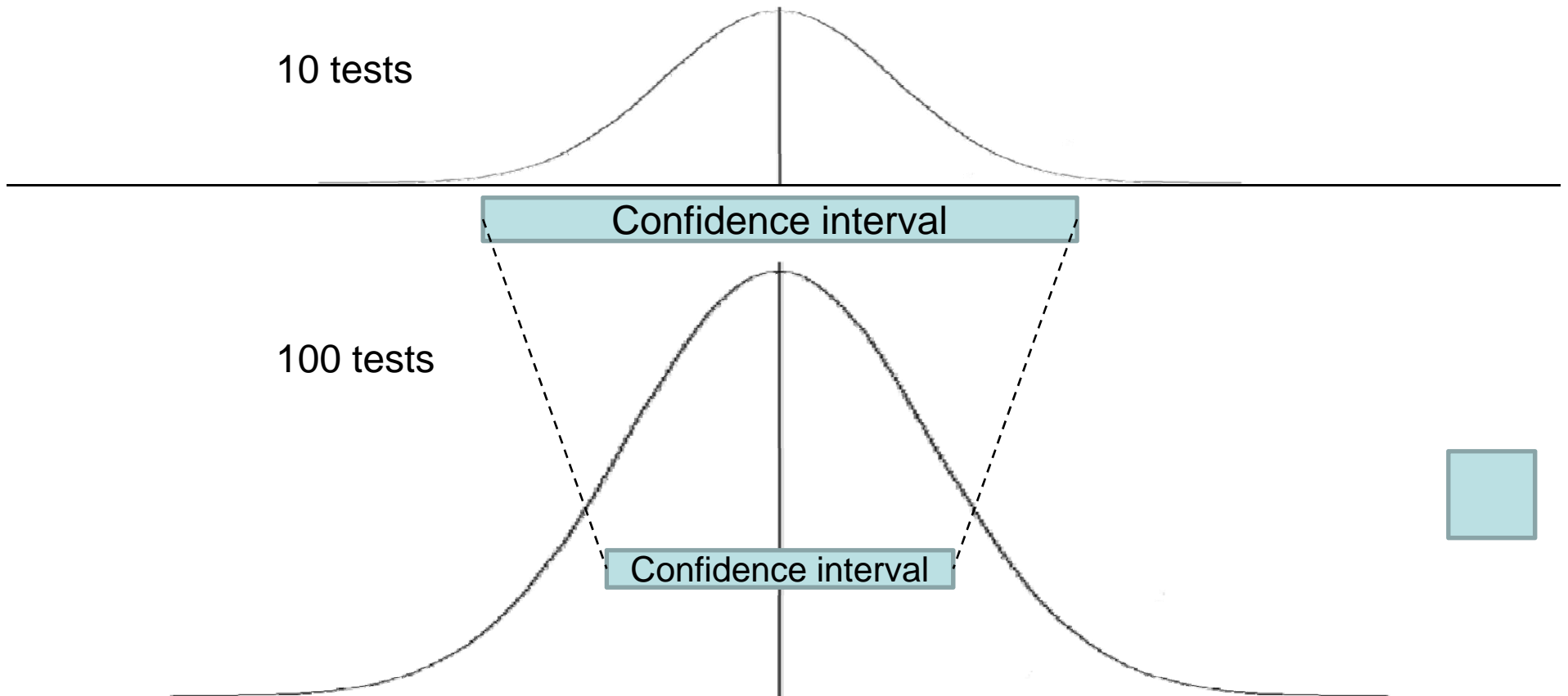
Higher variability



Increase tests => better precision Plus de tests=>meilleure précision

$$\text{Confidence interval} = \frac{t \cdot \text{Sigma}}{\sqrt{n}}$$

When / quand $n \rightarrow$
=> confidence interval \rightarrow





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Agreed international tolerances Tolérances internationales



Characteristic	Commercial tolerances
UHML	+/- 0.508 mm
UI	+/- 1 %
Strength	+/- 1.5 g/tex
Micronaire	+/- 0.1 unit
Rd	+/- 1 %
X.b (Yellowness)	+/- 0.5 unit



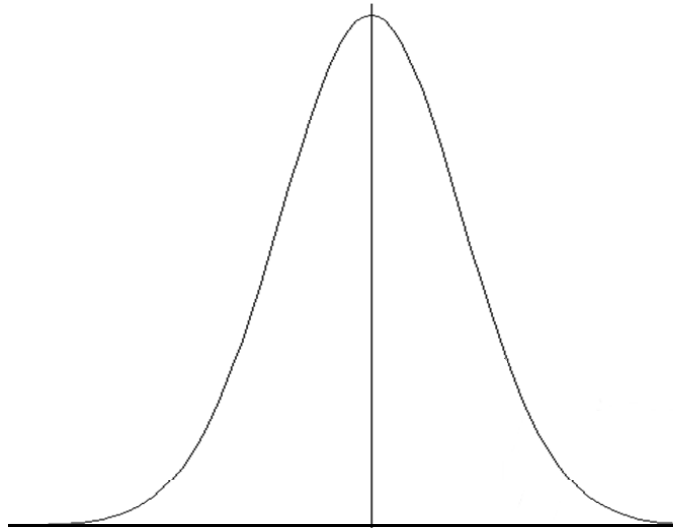
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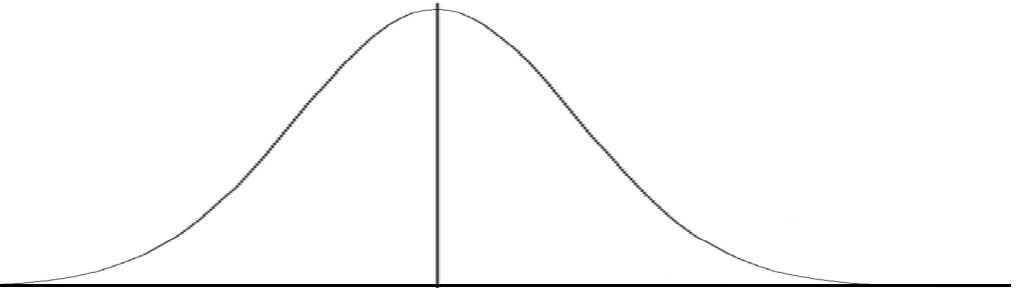
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Lower variability



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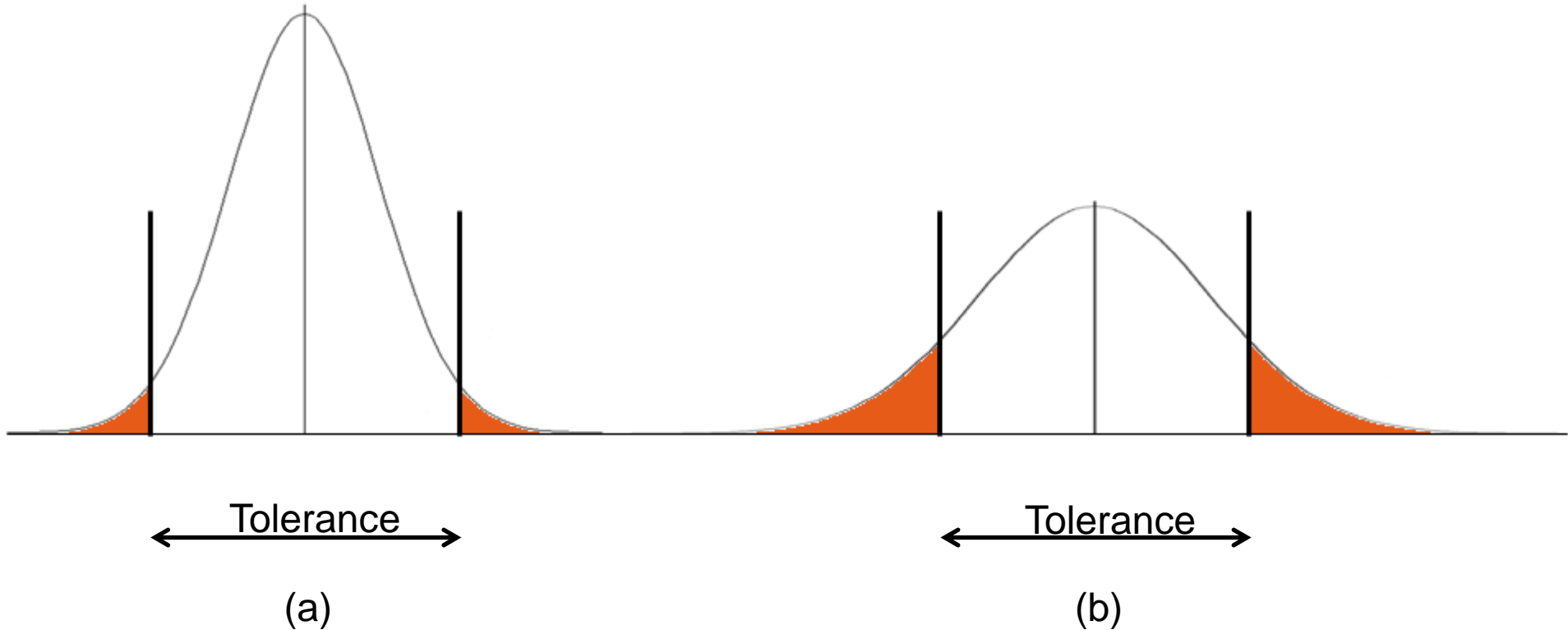


Variability, tolerances, litigation risk

Variabilité, tolérances, risque de litige

Lower variability

Higher variability



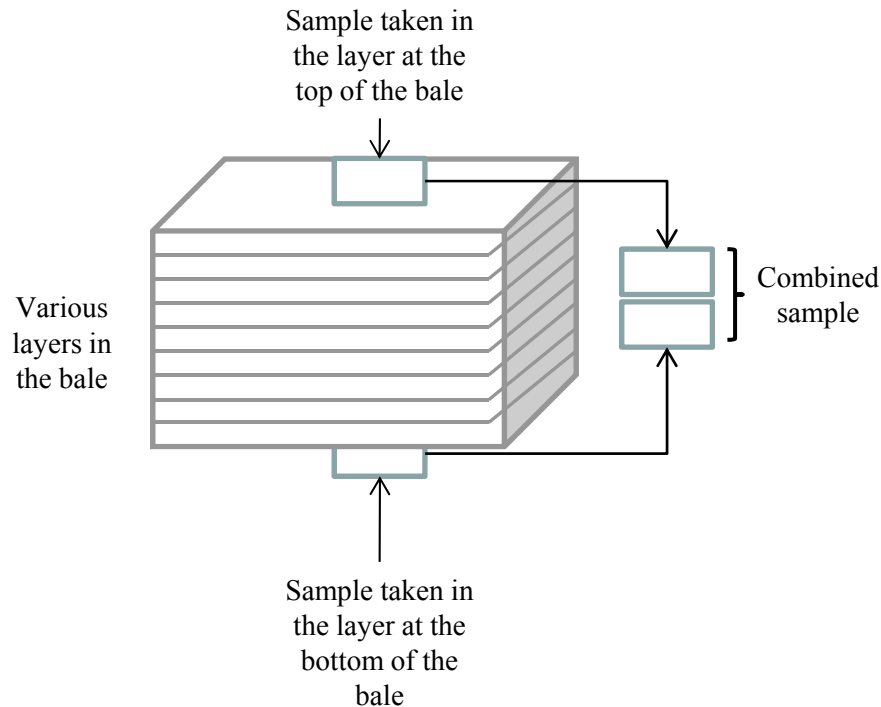
 Litigation risk area

Sampling and testing modalities

Modalités de test et d'échantillonnage

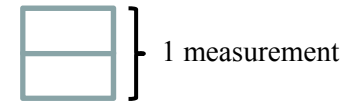
Sampling in the bale

Sample testing



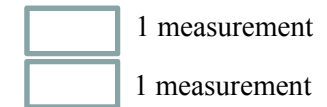
Sample analysis with one replicate of one measurement per sample

Composite testing



(a)

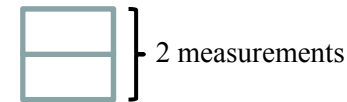
Cluster testing



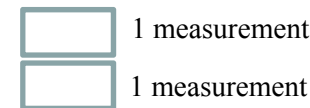
(b)

Sample analysis with one replicate of two measurements per sample

Composite testing

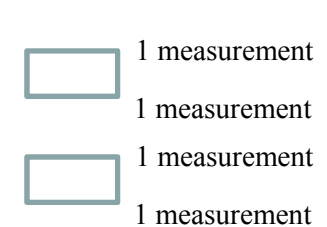


OR



(c)

Cluster testing



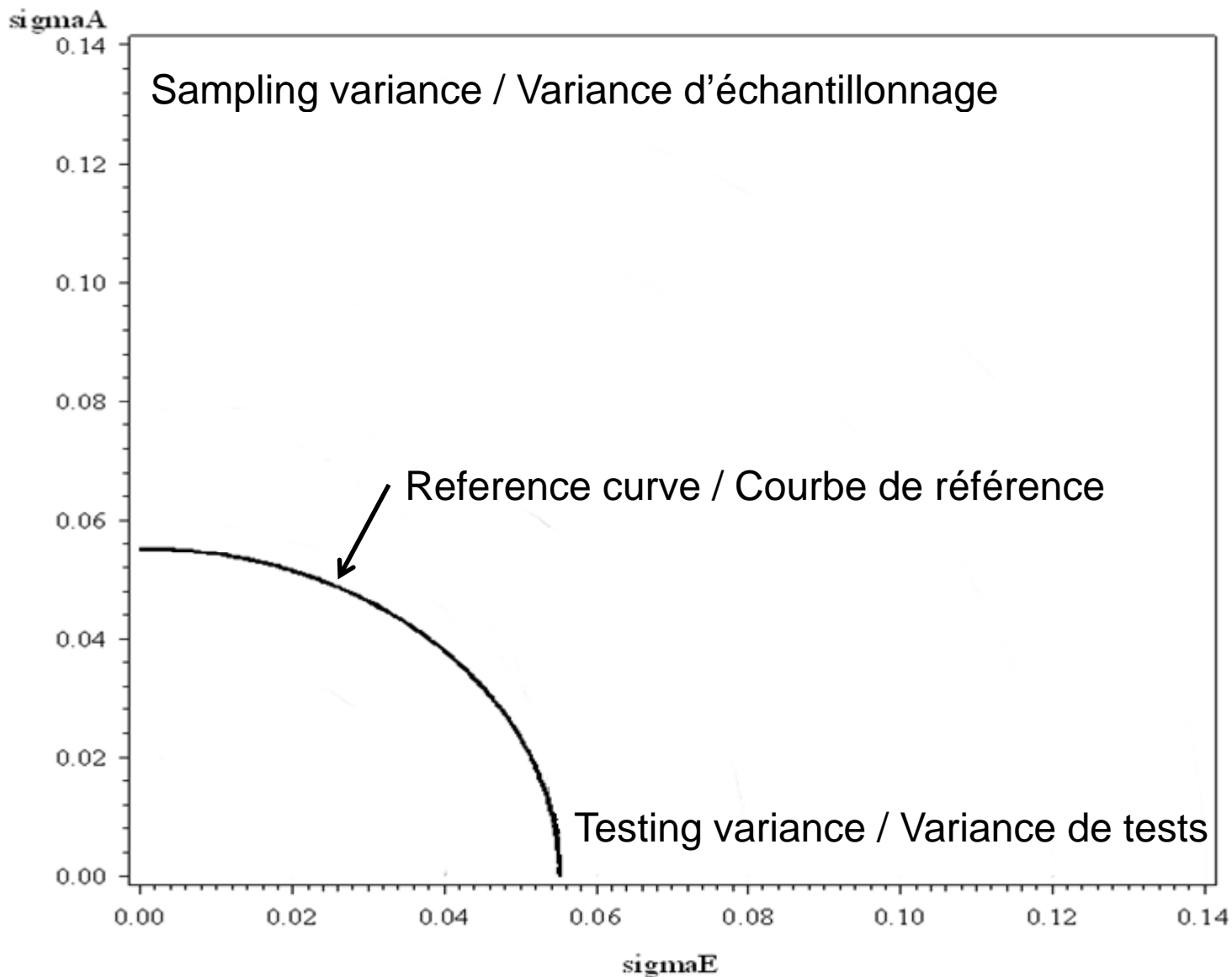
(d)



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Iso-variances charts Graphes d'iso-variance

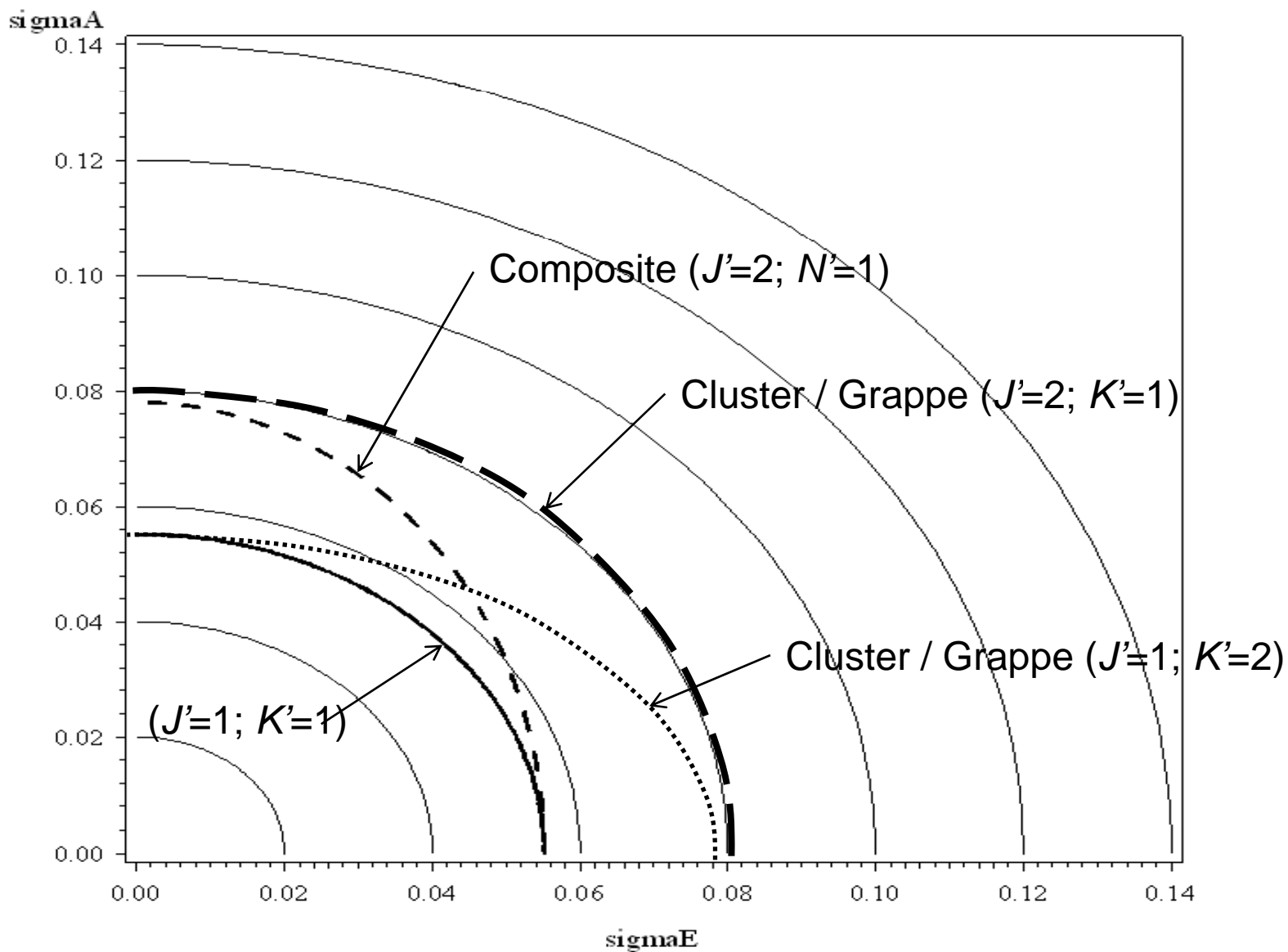




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Iso-variances charts Graphes d'iso-variance





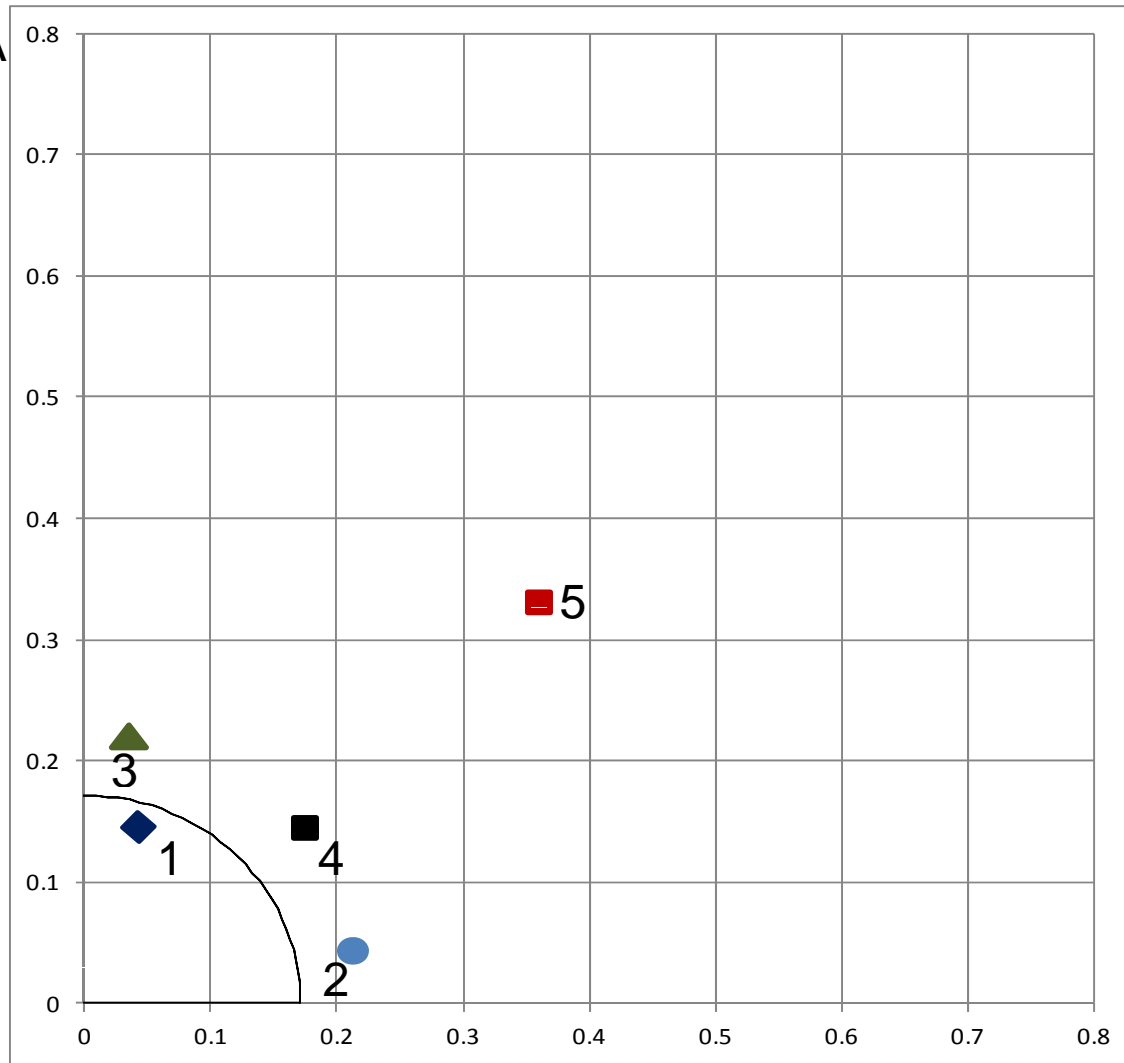
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Examples of relationships Exemples de relations



SigmaA



J'=1
K'=1

SigmaE

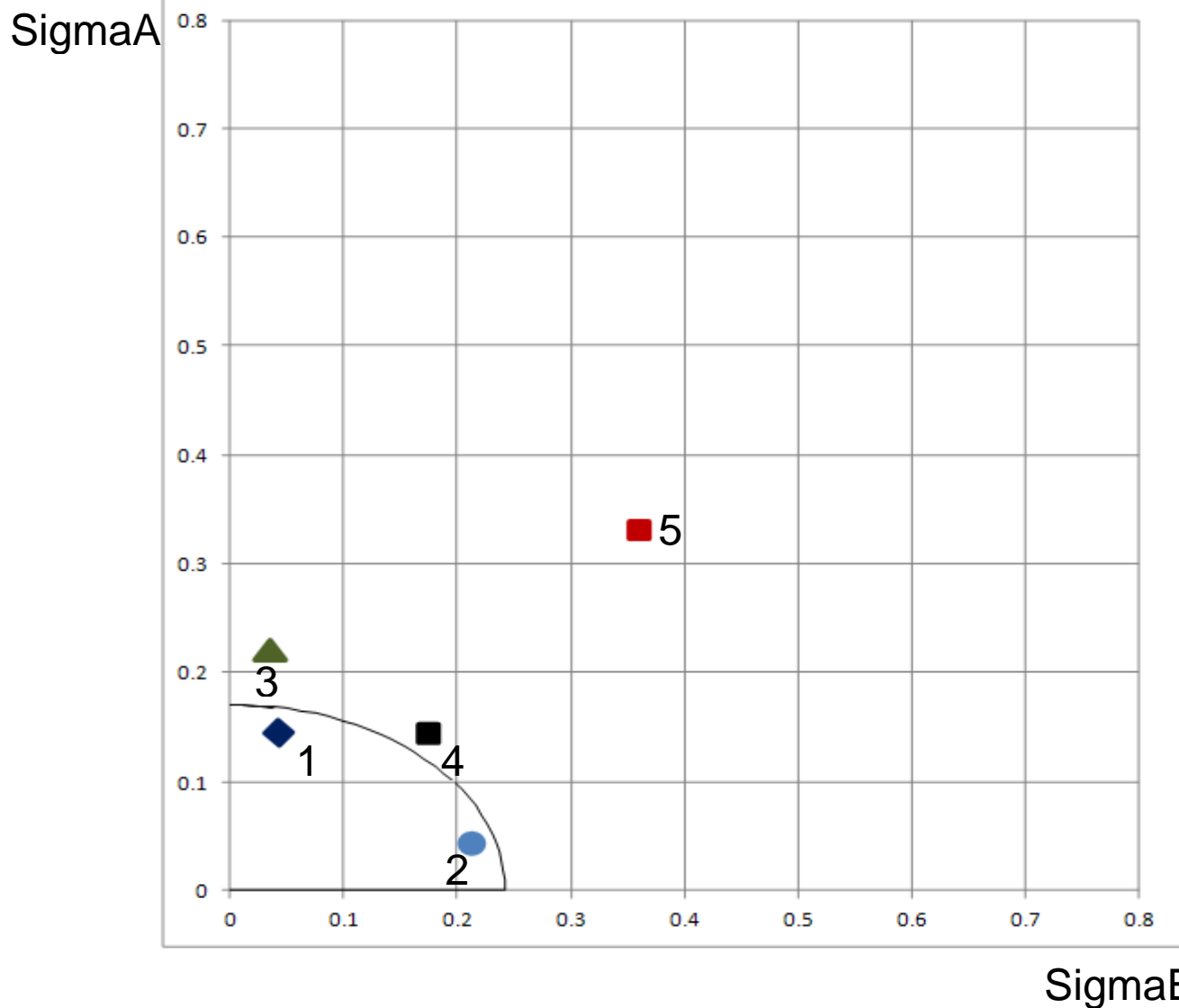


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Examples of relationships

Exemples de relations



$J'=1$
 $K'=2$

Cluster



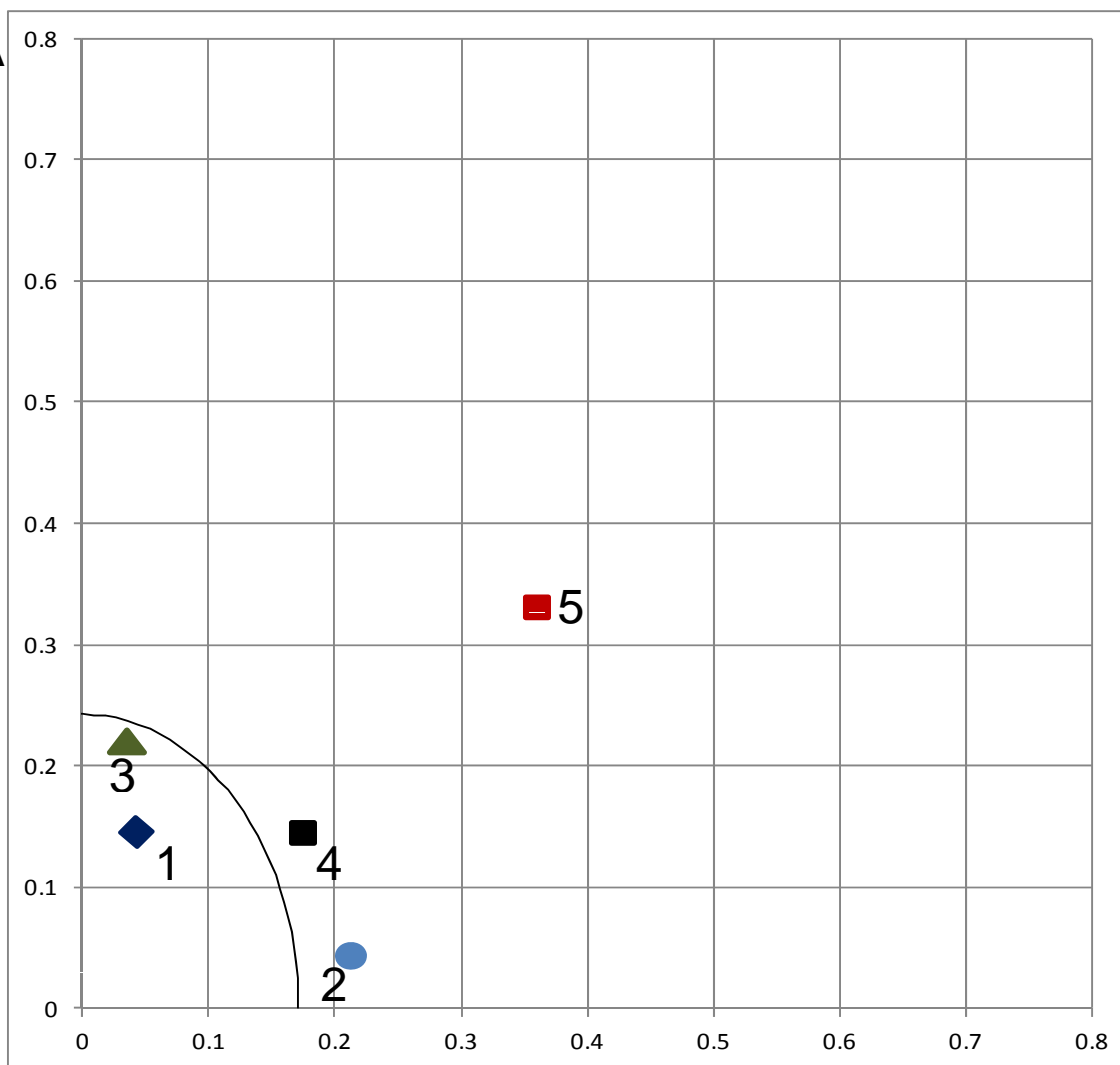
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Examples of relationships Exemples de relations



SigmaA



SigmaE

$J'=2$

$N'=1$

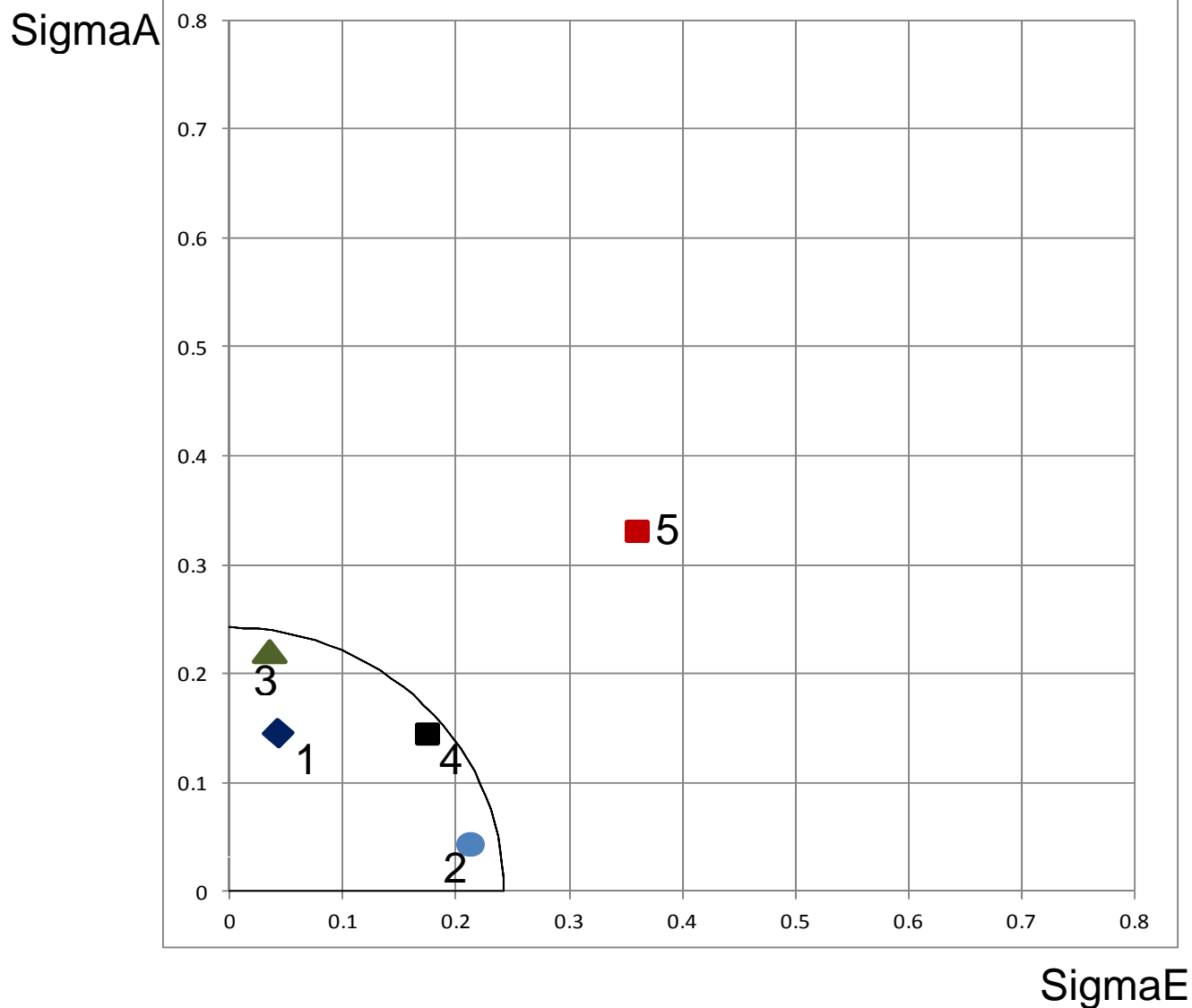
Composite



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Examples of relationships Exemples de relations



$J'=2$
 $K'=1$

Cluster



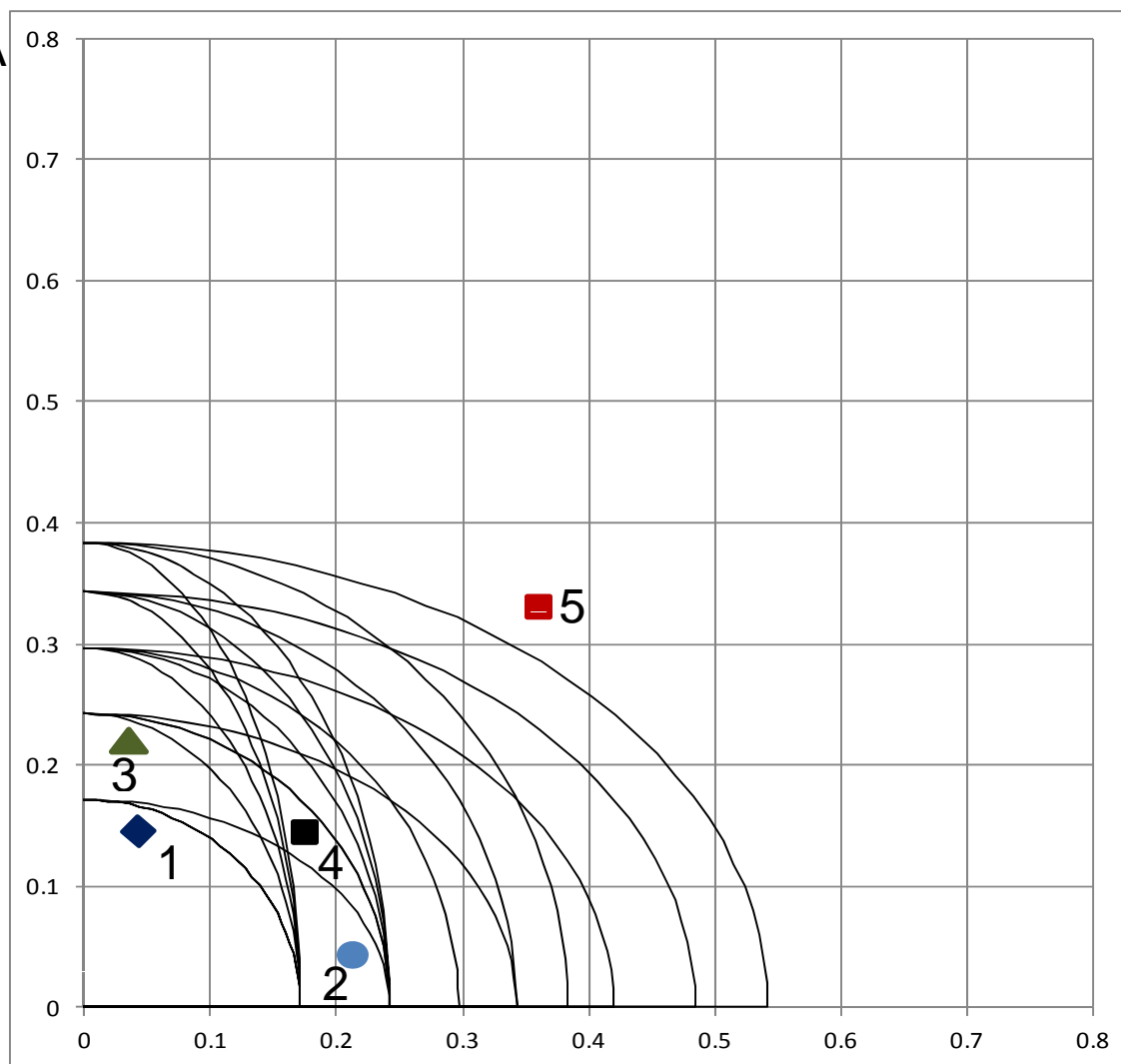
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Examples of relationships Exemples de relations



SigmaA



SigmaE

$J'=1,2,3,4,5$
 $K'=1,2$
 $N'=1,2,3,4$

Conclusion from the 1st study*

Conclusion de la 1^o étude*



Taking care of

- Situations
- Variability levels within bales (between layers and between repetitions of measurements)
- Agreed international tolerances
- Litigation risk set at 10% for individual bales

En prenant en compte

- Situations
- Niveaux de variabilité au sein des balles (entre couches et entre répétitions de mesures)
- Tolérances internationales reconnues
- Risque de litige fixé à 10% sur les balles individuelles

*: From Aboé et al, 2011 (sous presse)



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Conclusion from the 1st study*

Conclusion de la 1^o étude*



Characteristic	Nb of samples per bale	Type of sampling	Nb of replicates	Nb of measurements per sample	Total Nb of measurements per bale
USA					
Micronaire	2	Composite	1	1	1
UHML	2	Cluster	1	1	2
UI	2	Cluster	1	1	2
STR	2	Cluster	1	1	2
Rd	2	Cluster	1	2	4
+b	2	Cluster	1	2	4
Proposition for Africa / Proposition pour l'Afrique					
Micronaire	2	Composite	1	1	1
UHML	2	Cluster	1	2	4
UI	2	Cluster	1	2	4
STR	2	Cluster	1	2	4
Rd	2	Composite	1	2	2
+b	2	Composite	1	2	2
For saw ginned cottons / pour les cotons égrenés à la scie					

*: From Aboé et al, 2011 (sous presse)



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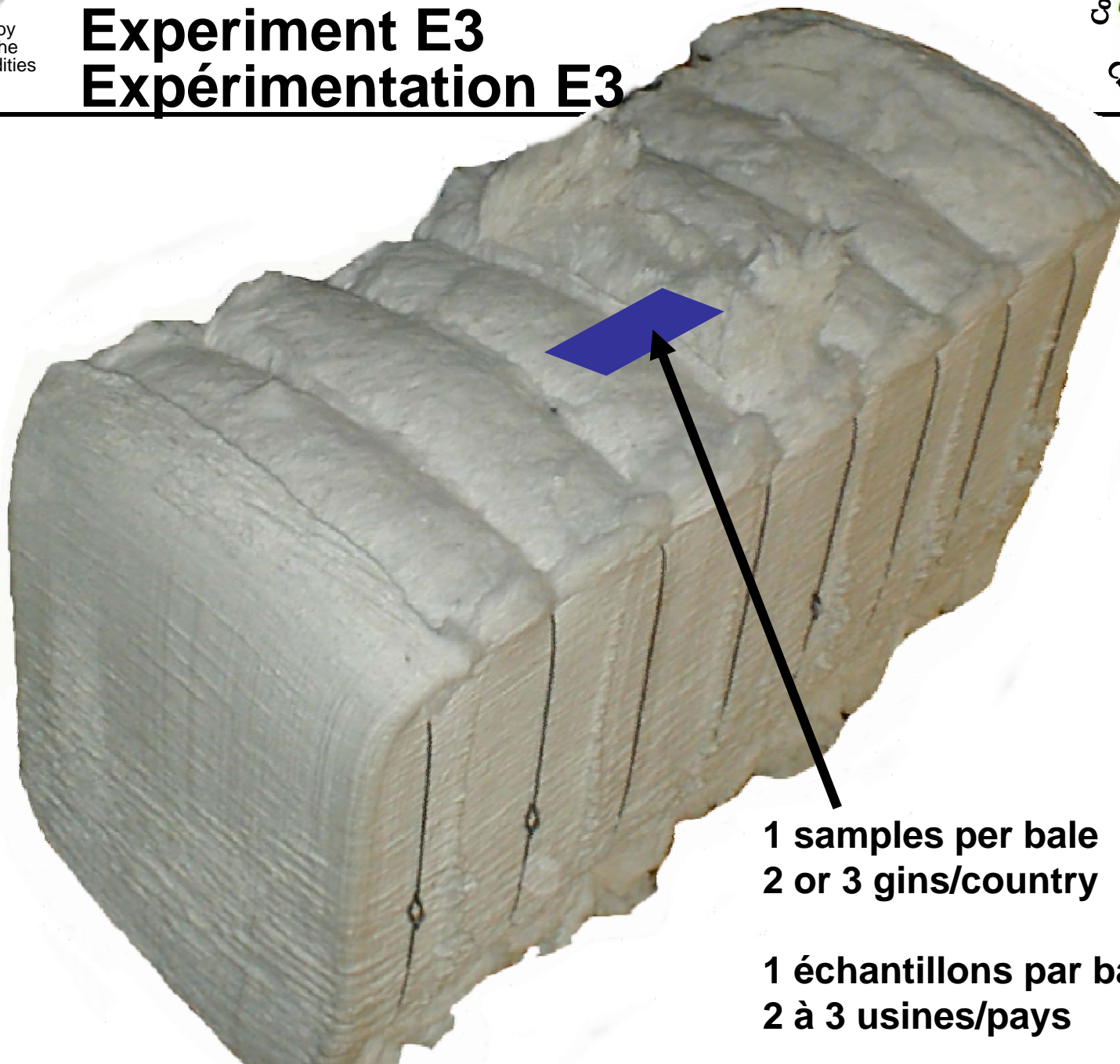


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Experiment E3

Expérimentation E3



**1 samples per bale
2 or 3 gins/country**

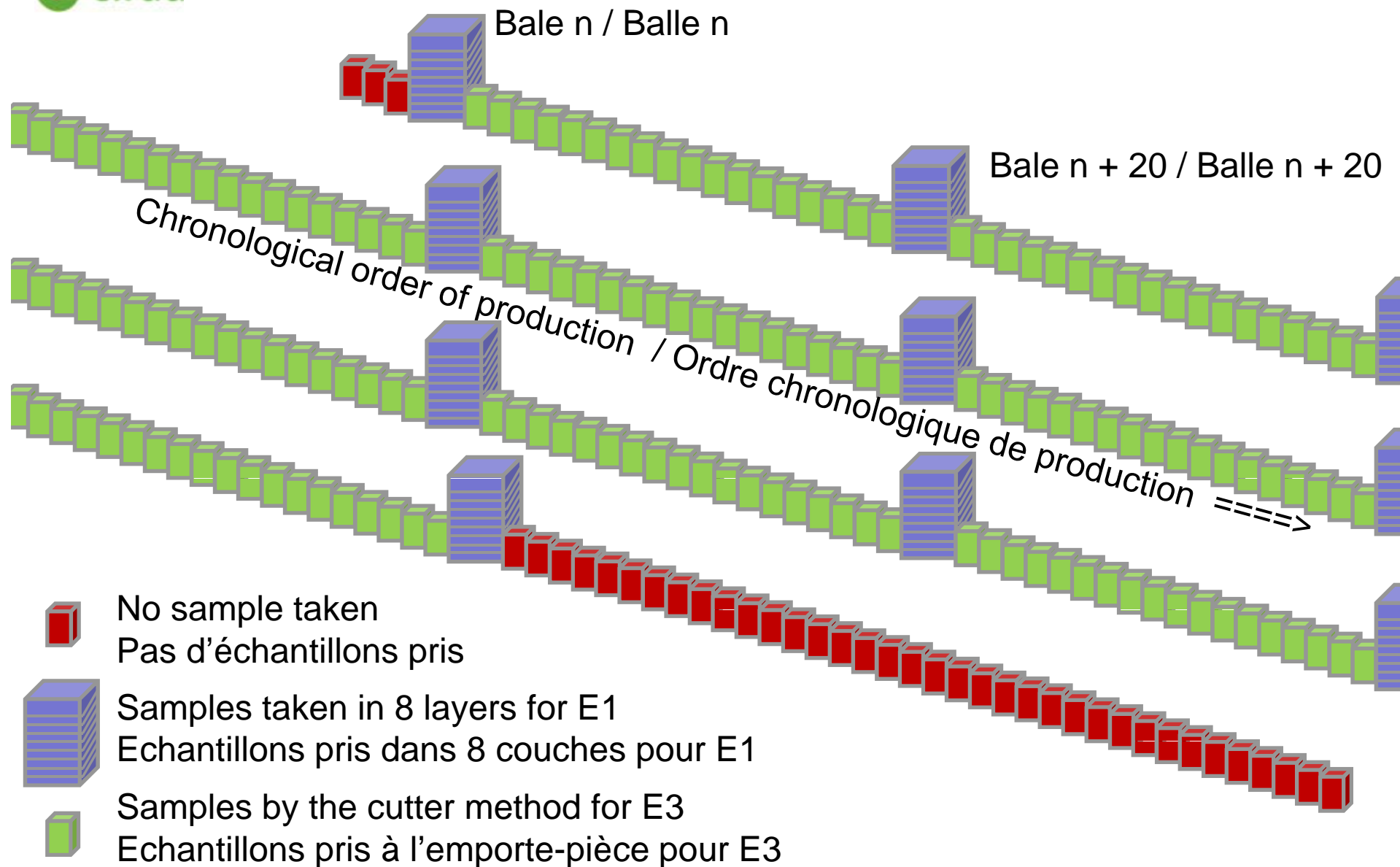
**1 échantillons par balle
2 à 3 usines/pays**



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Sampling for E1 and E3 Echantillonnage pour E1 et E3





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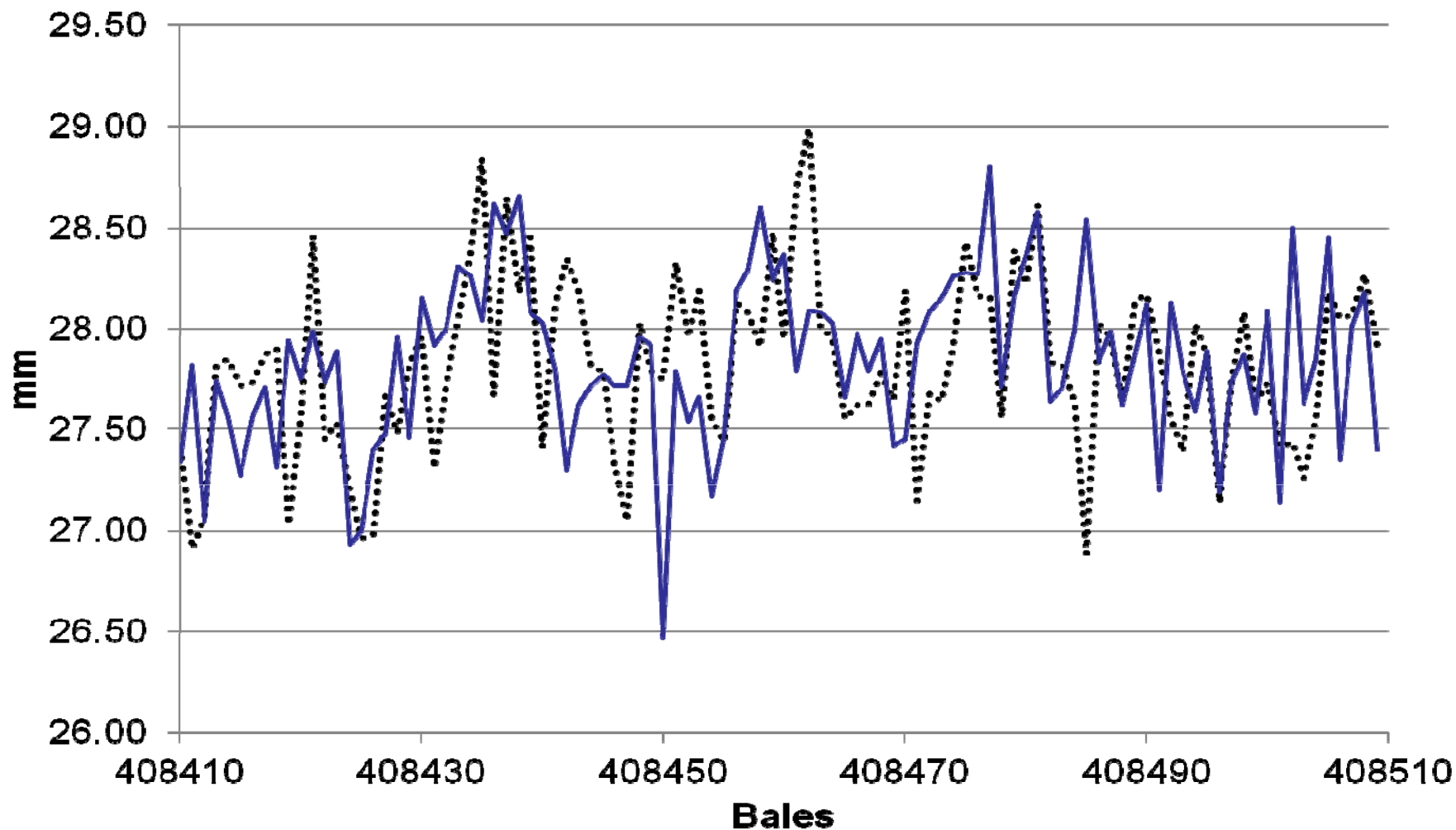


Between bales variability

Variabilité entre balles



Results are even accross the bales in this lot



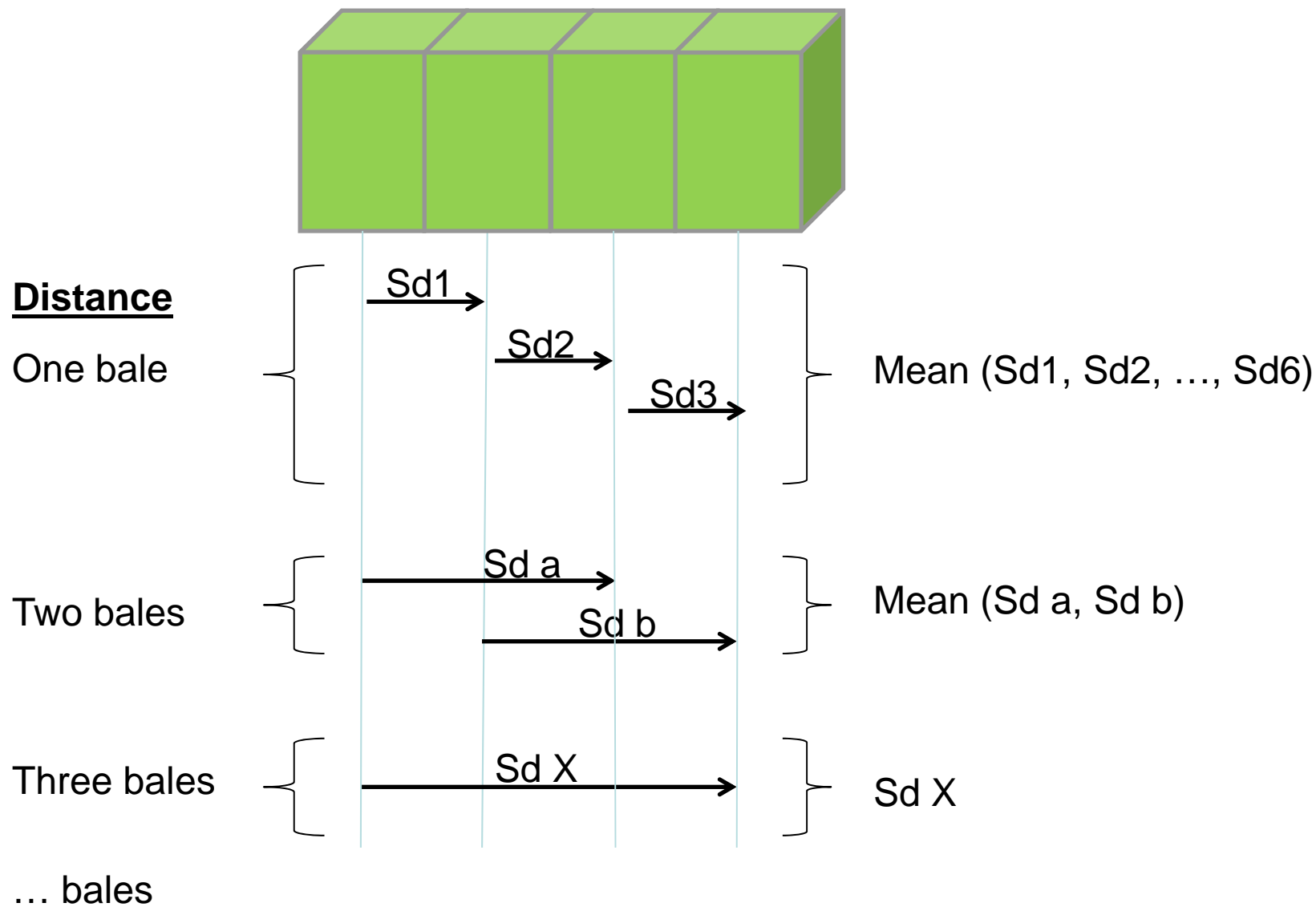
..... UHML rep 1 — UHML rep 2



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Between bales variability Variabilité entre balles





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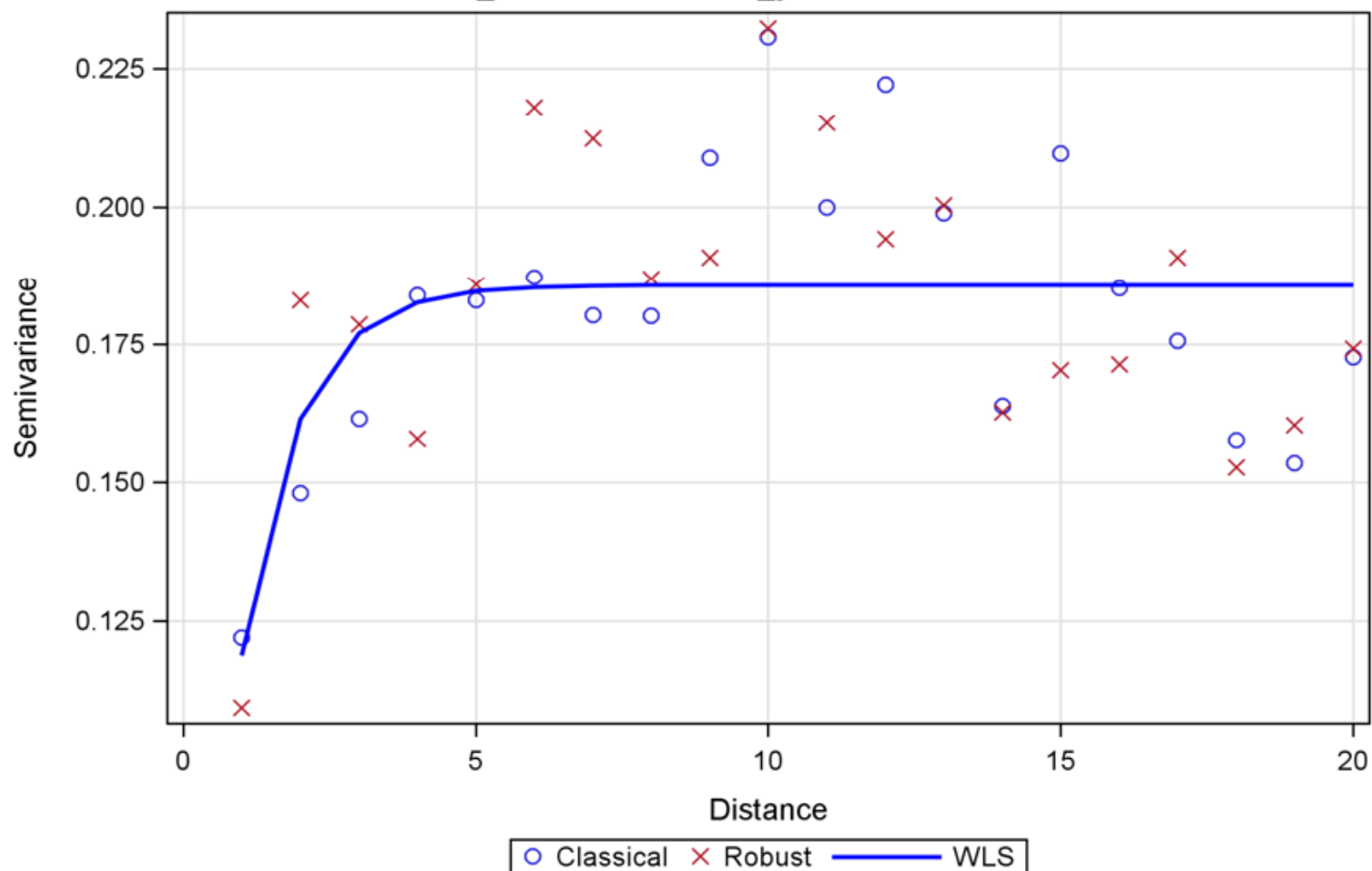
Between bales variability

Variabilité entre balles



Adjusted, Standard and Robust Semivariogram for UHML

UHML convergence=0 Converged plateau=0.1857751629 portee=0.9806153402 pepite=
1E-8 ro_b= 0.360678661 ro_y=0.3606786415

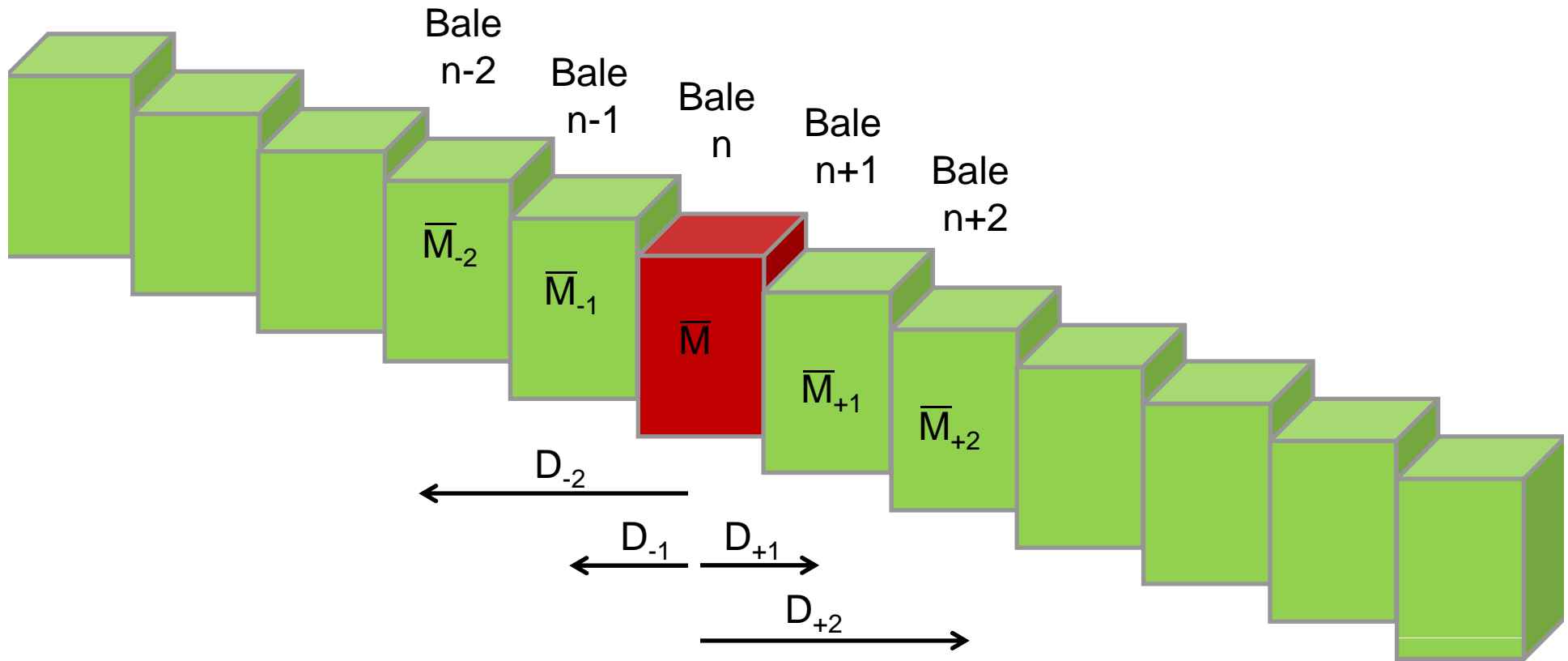




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Weighted averaging process Moyenne mobile pondérée



$$\text{Value of Bale } n = \frac{(D_{-2} \cdot \bar{M}_{-2}) + (D_{-1} \cdot \bar{M}_{-1}) + (\bar{M}) + (D_{+1} \cdot \bar{M}_{+1}) + (D_{+2} \cdot \bar{M}_{+2})}{D_{-2} + D_{-1} + 1 + D_{+1} + D_{+2}}$$



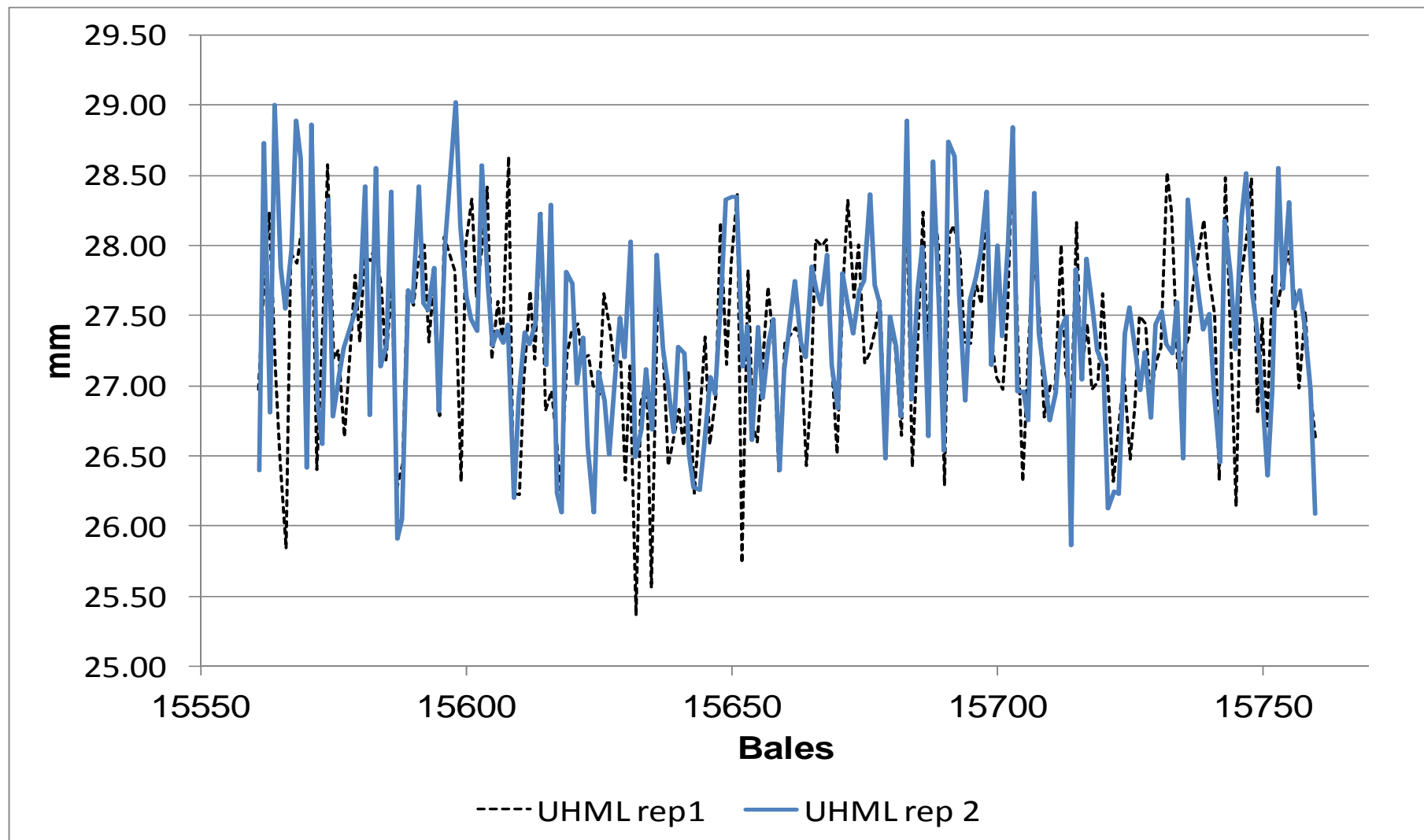
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Between bales variability Variabilité entre balles



Results are NOT even accross the bales in this lot





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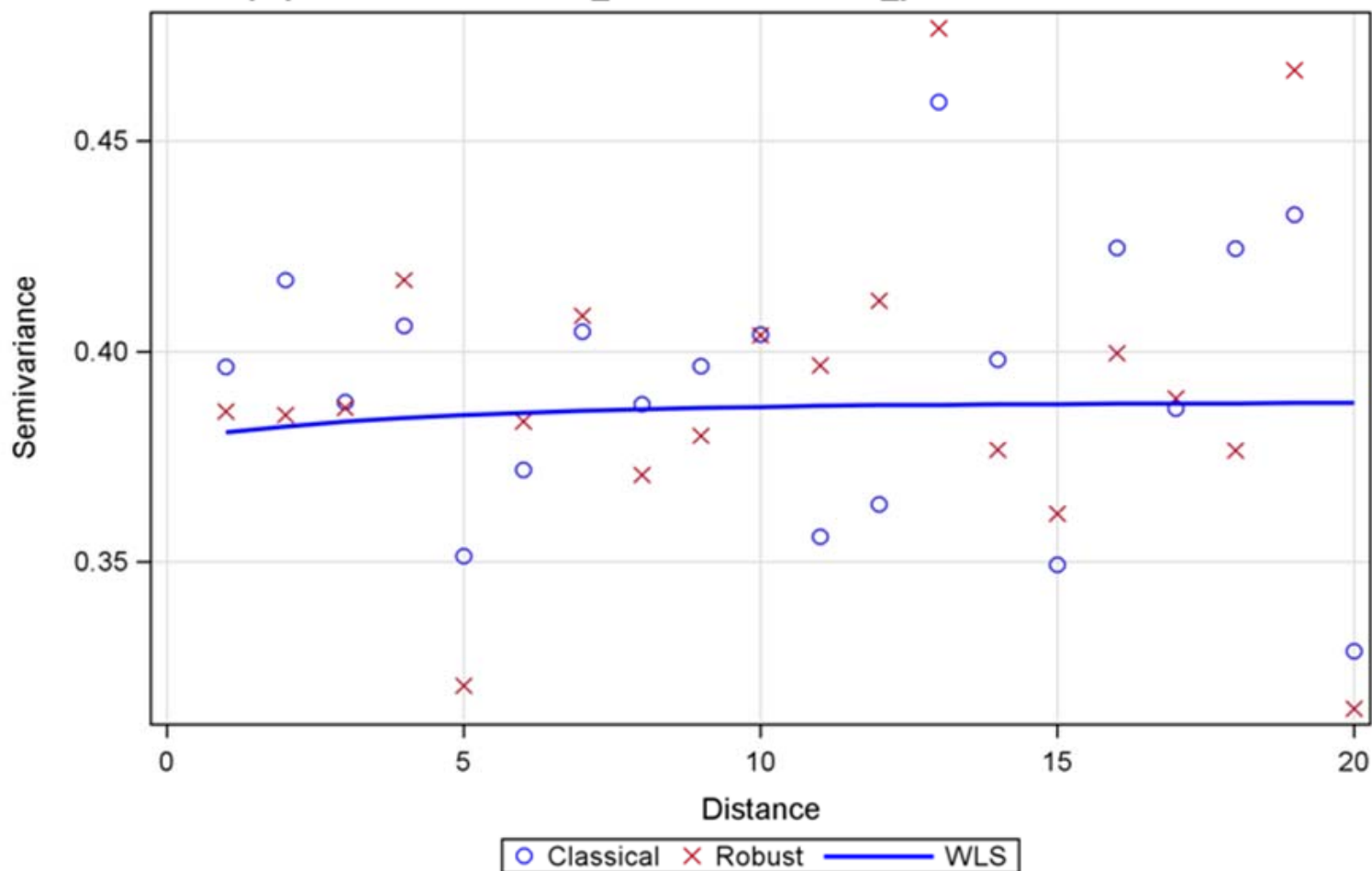


Between bales variability

Variabilité entre balles



Adjusted, Standard and Robust Semivariogram for UHML
UHML convergence=0 Converged plateau=0.0087085242 portee=4.6853207398
pepите=0.3793037093 ro_b=0.8078066368 ro_y=0.0181303656



Conclusion from the 2nd study

Conclusion de la 2^o étude



Taking care of

- Situations
- Variability levels between the bales at various distances
- Agreed international tolerances
- Litigation risk set at 10% for individual bales

En prenant en compte

- Situations
- Niveaux de variabilité entre les balles à différentes distances
- Tolérances internationales reconnues
- Risque de litige fixé à xx% sur les balles individuelles

Conclusion from the 2nd study

Conclusion de la 2^o étude



Taking care of

- Situations
- Variability levels between the bales at various distances
- Agreed international tolerances
- Litigation risk set at 10% for individual bales

=> Improved procedures

En prenant en compte

- Situations
- Niveaux de variabilité entre les balles à différentes distances
- Tolérances internationales reconnues
- Risque de litige fixé à xx% sur les balles individuelles

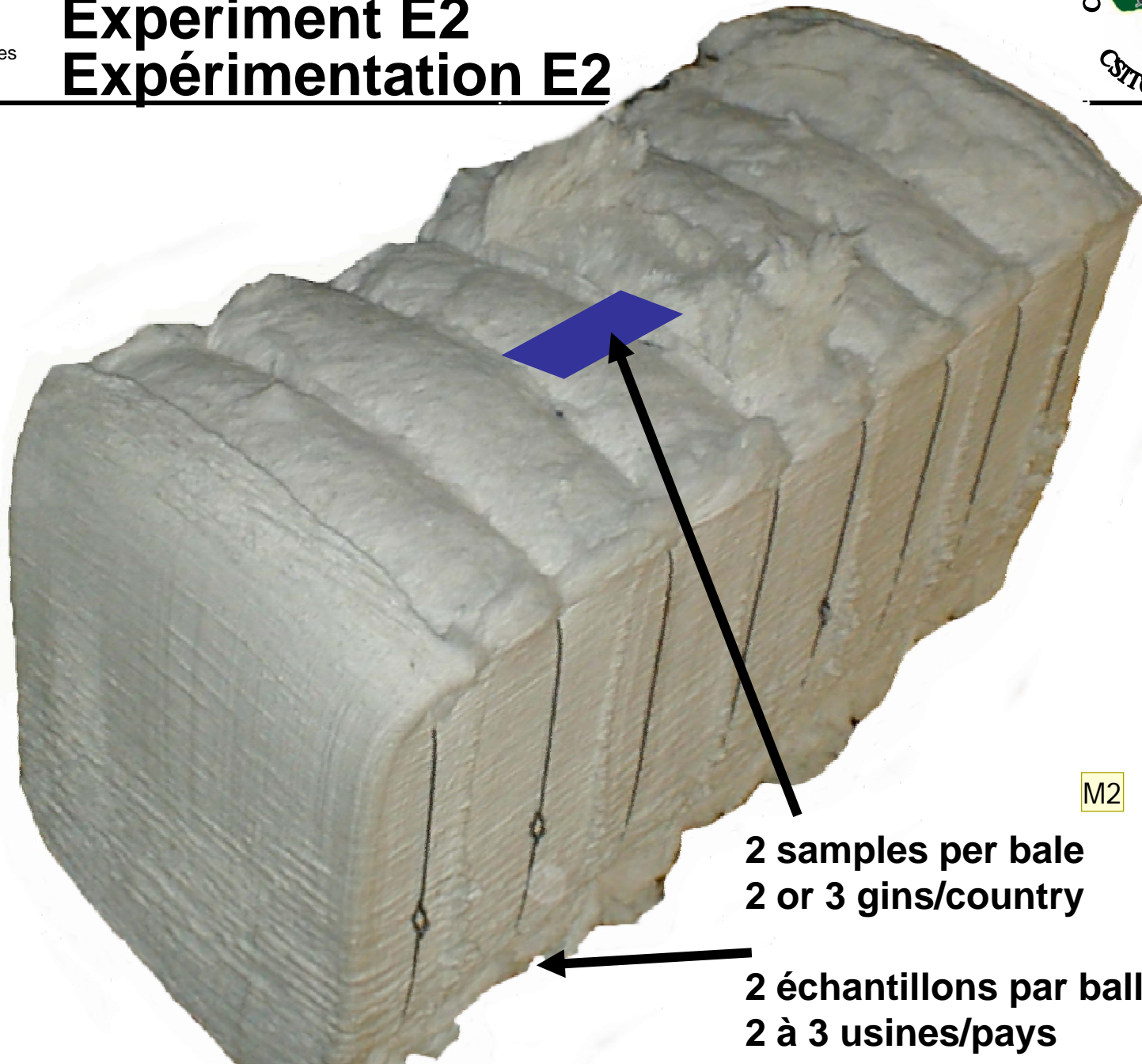
=> Procédures améliorées



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Experiment E2 Expérimentation E2



M2

2 samples per bale
2 or 3 gins/country

2 échantillons par balle
2 à 3 usines/pays

Diapositive 30

M2

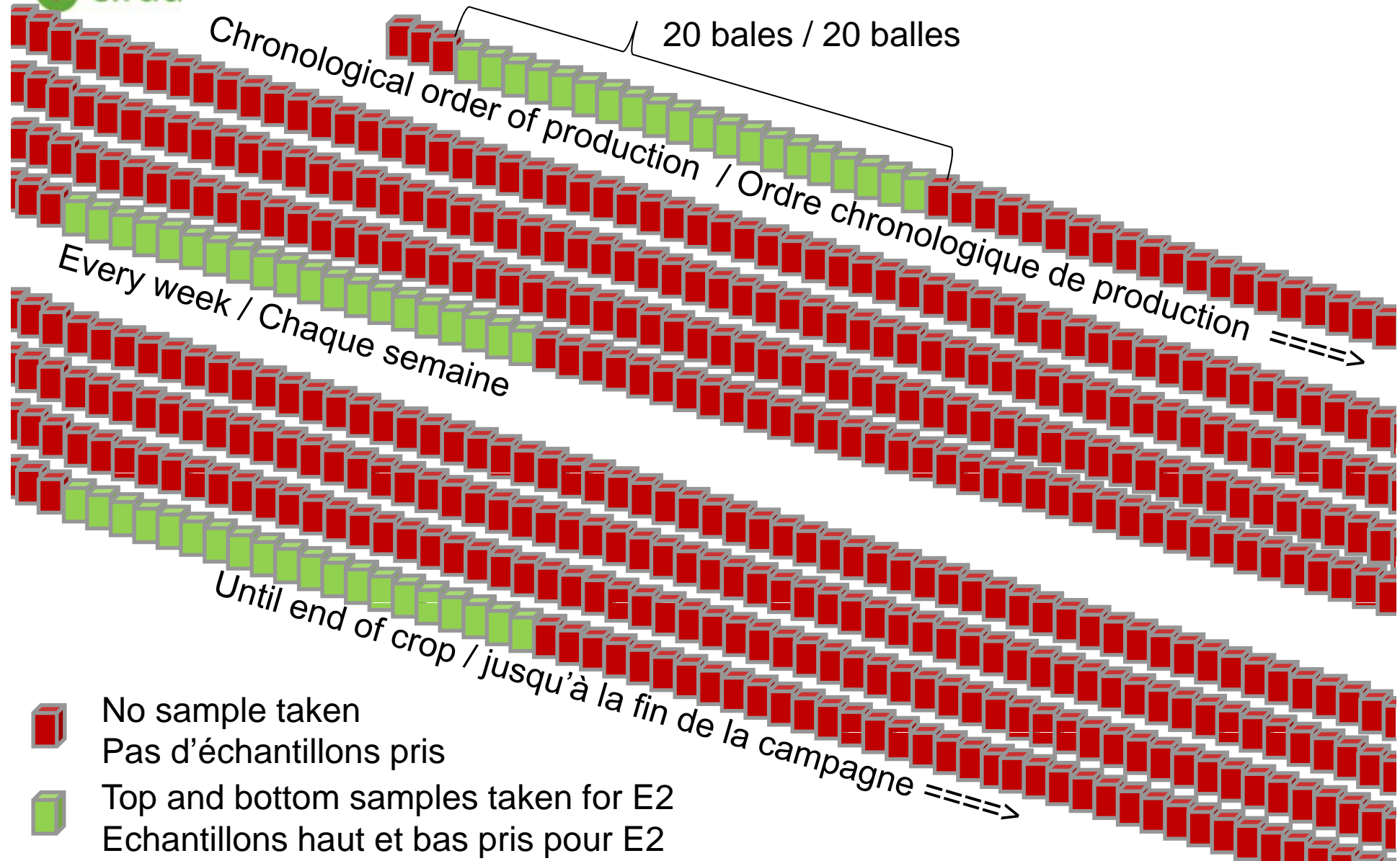
JPG pour bien décrire en anglais

Modeste, 01/03/2011



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Sampling for E2 Echantillonnage pour E2



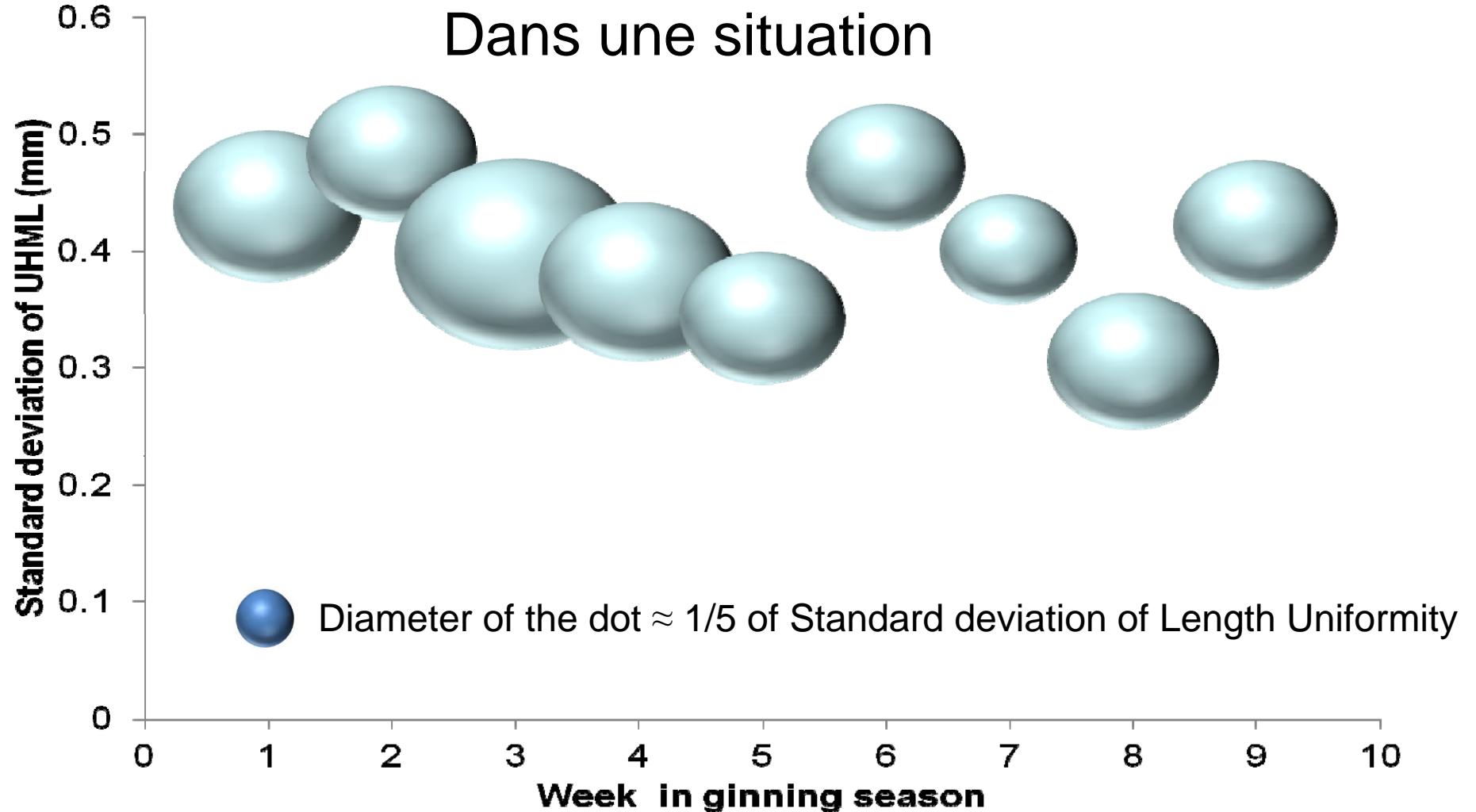


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Within-bale variability, season Variabilité intra-balles, campagne



In one situation
Dans une situation



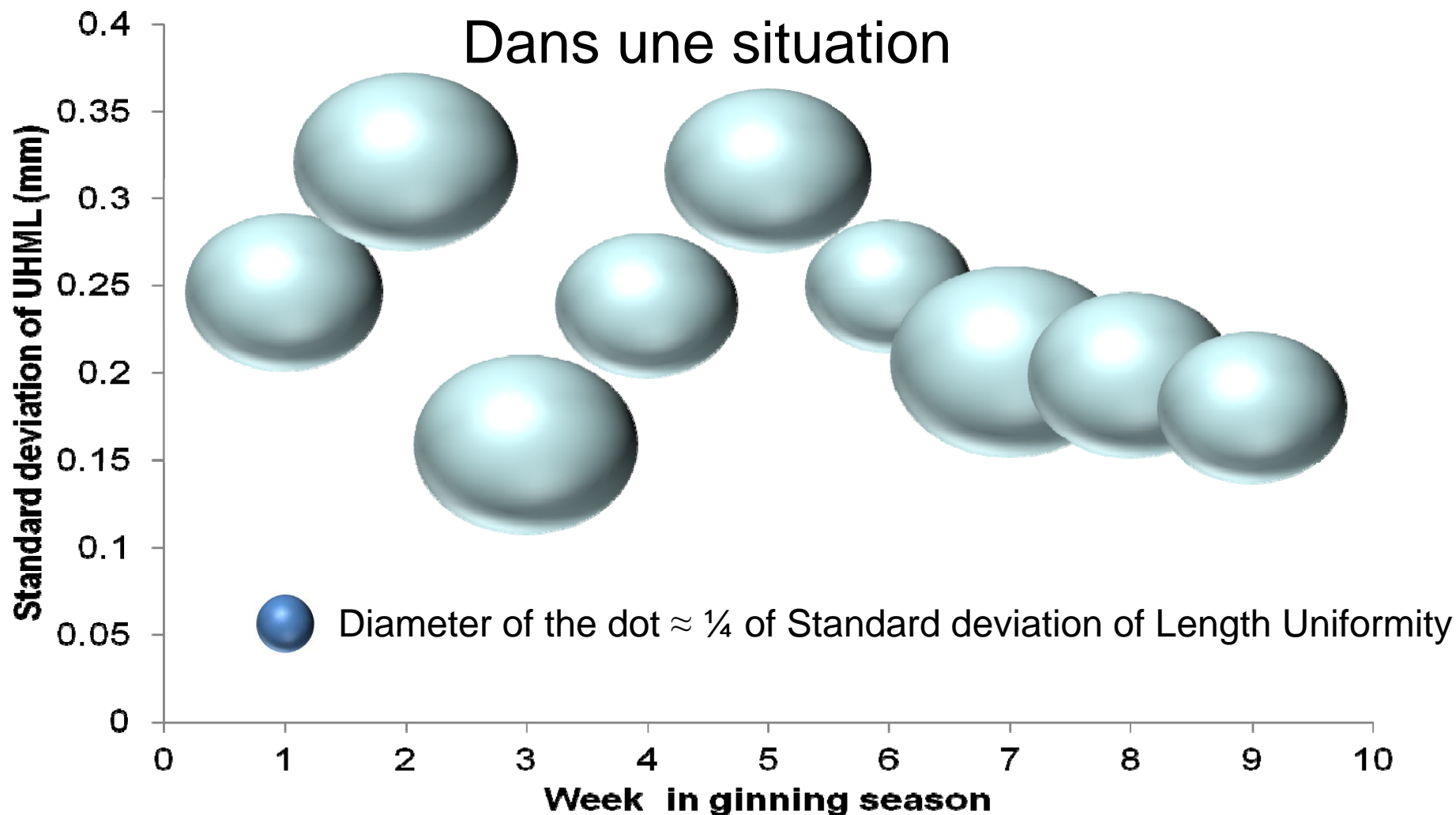


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Between bales variability, season Variabilité entre balles, campagne



In one situation
Dans une situation





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Next steps Prochaines étapes



- Ginning practices to be improved and/or studied in some cases
- Les pratiques d'égrenage doivent s'améliorer / s'étudier dans certains cas



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Next steps Prochaines étapes



- Ginning practices to be improved and/or studied in some cases
- Use the procedures for validation once at large scale
- Les pratiques d'égrenage doivent s'améliorer / s'étudier dans certains cas
- Utiliser les procédures pour les valider en grandeur réelle



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Next steps Prochaines étapes



- Ginning practices to be improved and/or studied in some cases
- Use the procedures for validation once at large scale
- All sites will receive a personalized and confidential report
- Les pratiques d'égrenage doivent s'améliorer / s'étudier dans certains cas
- Utiliser les procédures pour les valider en grandeur réelle
- Toutes les usines recevront un rapport personnalisé et confidentiel



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Next steps Prochaines étapes



- Ginning practices to be improved and/or studied in some cases
- Use the procedures for validation once at large scale
- All sites will receive a personalized and confidential report
- Start grouping bales into lots of homogeneous levels ... and
- Les pratiques d'égrenage doivent s'améliorer / s'étudier dans certains cas
- Utiliser les procédures pour les valider en grandeur réelle
- Toutes les usines recevront un rapport personnalisé et confidentiel
- Commencer à grouper les balles par lots de niveaux homogènes ... et



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Next steps Prochaines étapes



- Ginning practices to be improved and/or studied in some cases
- Use the procedures for validation once at large scale
- All sites will receive a personalized and confidential report
- Start grouping bales into lots of homogeneous levels ... and
- Start getting information on the financial benefit of using instrumental data for cotton classification and trading
- Les pratiques d'égrenage doivent s'améliorer / s'étudier dans certains cas
- Utiliser les procédures pour les valider en grandeur réelle
- Toutes les usines recevront un rapport personnalisé et confidentiel
- Commencer à grouper les balles par lots de niveaux homogènes ... et
- Commencer à regrouper les information sur le bénéfice financier d'utiliser les mesures instrumentales pour le classement de coton et sa commercialisation



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Limitations of the studies

Limites d'études



- Ginning practices to be improved and/or studied in some cases
- Use the procedures for validation once at large scale
- Test procedures for a serie of seasons as the variability may depend on several annual factors.
- Les pratiques d'égrenage doivent s'améliorer / s'étudier dans certains cas
- Utiliser les procédures pour les valider en grandeur réelle
- Tester les procédures sur quelques campagnes car la variabilité est dépendante de composantes annuelles



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Conclusion Conclusion



- Procedures are available from the within-bale variability study
- Procédures disponibles à partir de l'étude de variabilité intra-balle



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Conclusion Conclusion



- Procedures are available from the within-bale variability study
- Adjustments may decrease cost of testing from observation of the between-bales variability study, along the season, on several seasons
- Procédures disponibles à partir de l'étude de variabilité intra-balle
- Des ajustements peuvent diminuer les coûts de tests à partir de l'observation de la variabilité inter-balles, au long de la saison, sur plusieurs saisons



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Conclusion Conclusion



- Procedures are available from the within-bale variability study
 - Adjustments may decrease cost of testing from observation of the between-bales variability study, along the season, on several seasons
 - Instrumental classing is technically feasible in Africa; it only remains to make it economically possible on an every day basis
- Procédures disponibles à partir de l'étude de variabilité intra-balle
 - Des ajustements peuvent diminuer les coûts de tests à partir de l'observation de la variabilité inter-balles, au long de la saison, sur plusieurs saisons
 - Le classement instrumental est techniquement possible en Afrique ; il reste à le rendre économiquement opérationnel dans la vie de tous les jours



More details in:
Plus de détails dans :

ABOÉ M., GOURLOT J.-P., GOZÉ E., HUBLÉ P. and SINOIMERI A., 2011, New Findings on Within Bale Repeatability of Measurements obtained with Standardized Instruments for Testing Cotton (SITC) in *Gossypium Hirsutum* Fiber Produced in West and Central Africa, accepted in Textile Research Journal, sous presse.

Thanks for your attention